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A SURVEY COMPARING THE PERCEPTION OF CHIROPRACTORS AND PODIATRISTS IN THE MANAGEMENT OF PLANTAR FACSIITIS

A dissertation submitted to the Faculty of Health Sciences, University of Johannesburg, as partial fulfilment for the Masters degree in Technology, Chiropractic by

By: Jenevieve-Jeanette Taljaard

Year: 2021

Supervisor: _____ Date: 08/02/2021

Dr DM Landman

DECLARATION

I, Jenevieve-Jeanette Taljaard, declare that this dissertation is my own, unpaid work. It is being submitted as partial fulfilment for the Masters in Technology degree: Chiropractic, at the University of Johannesburg. It has not been submitted before any degree for examination at any other University.

_____

Jenevieve-Jeanette Taljaard

On the 8th day of the month of February of 2021

DEDICATION

This thesis is dedicated to my family, who stood by me through every step of this degree. Firstly, I would like to thank my mother Desiree Taljaard, Theo Kalamaris, Ina and Frank Scheepers, for supporting me in every step of the way. Your unconditional love, compassion and support have driven me to become the best version of myself.

To my fiancé, Johann Klopper, no thanks will never be big enough. You have lifted me through every step of the way, guiding me, supporting me and loving me unconditionally. Thank you for being my pillar and biggest supporter.

Auntie Valita and Uncle Klasie Klopper, thank you for all your help for the past six years. Thank you for your unconditional support in every aspect. I am eternally grateful for everything you have done for me.

Bright Foundation Trust, thank you for the financial support for the past six years, without your contribution this wouldn't have been possible. Thank you for believing in me and trusting me to pursue my dream of becoming a Chiropractor.

Damian, Karla and Eleanor, thank you for being the most beautiful friends anyone could ever ask for. This has been the most thrilling experience, and I wouldn't want to share it with anyone else.

ACKNOWLEDGEMENTS

I want to acknowledge the following individuals, institutions and organisations:

To my supervisor, Dr DM Landman, thank you for your assistance, guidance, and patience throughout my research process. Thank you for assisting through the difficult time of Covid-19.

Thank you to Jaclyn at the Statistical Consultation Service at the University of Johannesburg, who assisted me with my questionnaire and my online survey setup.

Thank you to Dr Lizell Korff at Lizell Korf Associates for your patience, kindness, and help with my statistics. I am grateful for your timely response and availability. Your assistance has benefitted me tremendously.

ABSTRACT

Background: Plantar fasciitis could be described as a heel pain syndrome characterised by pain, significantly when arising from rest. Most research describes plantar fasciitis as an inflammatory condition, but researchers question if inflammation is present in the disease. Patients' pain is described as a "first-step pain" that is sharp on the inner aspect of the plantar part of the foot. Ten per cent of the general population will experience plantar fasciitis at least once in their lifetime. Chiropractors and Podiatrists are professional practitioners that are involved in the management of plantar fasciitis. Both these practitioners report that plantar fasciitis is one of the most complicated musculoskeletal conditions to treat. As plantar fasciitis's natural history is not yet fully understood, it can be difficult to distinguish between a patient who recovers spontaneously and responds to treatment. Clinical practice guidelines suggest that various conservative treatment methods could be used for the treatment of plantar fasciitis. These guidelines indicate that 27 different treatment methods could be used for the management of plantar fasciitis.

Aim: The study aimed to explore the similarities and differences in the perception of and the most common treatment methods for plantar fasciitis between chiropractors and podiatrists.

Method: A questionnaire was a self-administered and adapted version based on a similar study done by Ferdinand et al (2014) which compared the perception of physiotherapists and podiatrists in the management of plantar fasciitis. Questions were adapted by the researcher with assistance from STATKON to ensure the questions and structure aligned with Ferdinand et al's (2014) study.

Procedure: The study sample consisted of the registered chiropractors of CASA and all the registered podiatrists of PASA. The total number of registered chiropractors at CASA stood at 575, and the total number registered podiatrists at PASA stood at 117. CASA and PASA were sought for assistance in the distribution of the survey link. CASA sent out the email link for all the registered chiropractors and PASA for podiatrists. Since the respective associations distributed the questionnaire on the researcher's behalf, no personal information was disclosed. All participants who completed the questionnaire were anonymous. No identifying data was asked to

ensure anonymity. A total of 100 completed responses shared between chiropractors and podiatrists was necessary for the research to be valid and reliable.

The response rate was 23.84%. Only 105 questionnaires were valid and reliable for data analysis. 60 of the 165 Questionnaires were discarded due to incorrect answering of questions. A low response rate was due to the survey's anonymity since it was not possible to follow up with participants telephonically or encourage participants to complete it. Another contributing factor that could have affected the response rate was the accuracy of the databases used to distribute the survey. Participants did not update their contact details with their respective associations. The low response rate could also have been because of electronic filters that place the survey link in the participants' spam box.

Results: It was established that podiatrists see more plantar fasciitis patients compared to chiropractors. Podiatrists used fewer sessions to treat plantar fasciitis than chiropractors. Chiropractors and podiatrists agreed on treatment methods they both perceive to work for plantar fasciitis. Each of these two professions established their treatment methods of choice. Chiropractors and podiatrists, more or less, agreed on their limitations to treat the condition, but there was a distinguishable difference in service limitation. The perception of treatment roles showed prospective input but still need further evidence and investigation.

Conclusion: Chiropractors and podiatrists agreed on the following treatment methods to treat plantar fasciitis: activity modification advice, rest, calf-stretching, taping/strapping and ball-rolling. Both these professions agree on these treatment methods. Each of the occupations had their opinions on which methods they specifically use for treating plantar fasciitis. Chiropractors decided to use cross friction massage, instrumental-assisted soft tissue mobilisation (fascial release), manipulation of the ankle joint, joint mobilisation, and soft tissue mobilisation. At the same time, podiatrists preferred to use custom orthotics, arch support orthoses, heel cups/pads, night splints, and compression. Most chiropractors and podiatrists agreed that they did not have personal limitations or service limitations to treat. Still, a significant number

of chiropractors who reported their personal limits to treatment were due to factors that alter the foot and ankle's biomechanics.

In contrast, fewer podiatrists reported the same factors as causing their limitations. One can conclude that podiatrists have more extensive knowledge of the foot and ankle's biomechanics.

The perception of treatment roles could not be well established, as chiropractors and podiatrists disagreed on numerous treatment methods. There is quite a conflict in the over-lapping of the boundaries for each profession's treatment role. It is anticipated that this could negatively affect the effectiveness of the management of plantar fasciitis. Until further evidence reveals the most effective treatment for plantar fasciitis, and which discipline is best responsible for providing the most effective treatment method.

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BMI: Body mass index

MRI: Magnetic resonance imaging

NSAID: Nonsteroidal anti-inflammatory drug

IASTM: Instrument assisted soft tissue mobilisation

CASA: Chiropractic Association of South Africa

PASA: Podiatry Association of South Africa

STATKON: Statistical Consulting Agency

SPSS: The Statistical Package for the Social Sciences

P-VALUE: Probability value

L: Lumbar

S: Sacral

Chapter One

Introduction

1.1 Introduction

Plantar fasciitis can be described as a heel pain syndrome characterised by pain, significantly when arising from rest. Most research describes plantar fasciitis as an inflammatory condition, but researchers question if inflammation is present in the disease.

Patients' pain is described as a "first-step pain" that is sharp on the inner aspect of the plantar part of the foot. Ten per cent of the general population will experience plantar fasciitis at least once in their lifetime (Uden, Boesch & Kumar, 2011).

The plantar fascia is an aponeurosis that is a tendon-like structure, broad, flat, and fibrous. The fascia consists of collagen fibres that are irregular (Uden et al., 2011). The plantar fascia is responsible for providing stability for the foot's arch (Lisowski, 2004).

Chiropractors and Podiatrists are professional practitioners that are involved in the management of plantar fasciitis. Both these practitioners report that plantar fasciitis is one of the most complicated musculoskeletal conditions to treat (Ferdinand & Smith, 2014). As plantar fasciitis's natural history is not yet fully understood, it can be difficult to distinguish between a patient who recovers spontaneously and one that responds to treatment.

Clinical practice guidelines suggest that various conservative treatment methods should be used for the treatment of plantar fasciitis. These guidelines indicate that there are 27 different treatment methods that can be used for the management of plantar fasciitis (Thomas, Christensen, Kravitz, Mendicino, Schuberth, Vanore, Weil, Zlotoff, Bouché, & Baker, 2010). Chiropractors and Podiatrists use both different and similar methods to manage plantar fasciitis, and both practitioners are successful in the treatment of plantar fasciitis.

1.2 Aims of the study

The study aimed to explore the similarities and differences in the perception of and the most common treatment methods for plantar fasciitis between Chiropractors and Podiatrists.

1.3 Possible outcomes

The study's possible outcomes could provide the most commonly used treatment methods for plantar fasciitis and indicate the respective roles of chiropractors and podiatrists in the management of plantar fasciitis.

Chapter two

Literature review

2.1 Introduction

The following chapter will discuss chiropractic, podiatry, and the condition plantar fasciitis, including the anatomy, pathophysiology, biomechanics, and different treatment procedures that can be used to treat plantar fasciitis.

2.2 Definition of plantar fasciitis

Plantar fasciitis is one of the most common causes of heel pain in adults, with distinct pain on the first few steps in the morning or after long periods of inactivity (Young, Rutherford & Niedfeldt, 2001). It can be described as a chronic heel pain caused by degenerative irritation of the connective tissue aponeurosis, at the plantar fascia's insertion on the calcaneal tuberosity on the medial process (Young et al., 2001). The degenerative process is the same as that of chronic necrosis, which means the loss of collagen continuity, increasing vascularity and connective tissue of the matrix of the fascia, leading to an appearance of fibro-blasts. Repetitive micro-tearing of the plantar fascia during this degenerative process will alter the body's ability to repair itself.

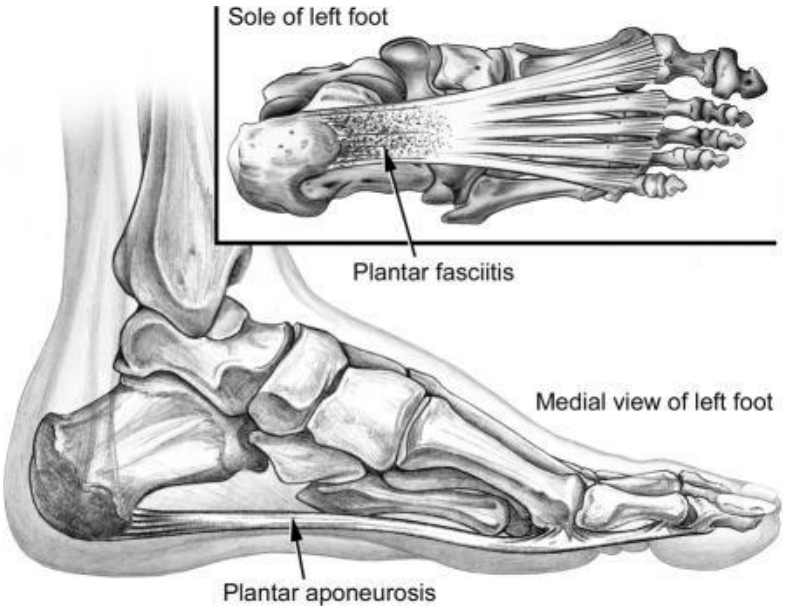

Figure 2.1: *Diagram illustrating plantar aponeurosis and plantar fasciitis (Bolga & Malone, 2004)*

2.3 Prevalence of plantar fasciitis

Chronic plantar heel pain affects both the physically active and inactive. A study done by Nahin in 2018 in the United States found the following data on the prevalence of plantar fasciitis: One per cent of the population was reported to have plantar fasciitis in the past year and more than three quarters had plantar aspect pain symptoms in the previous month. The prevalence of diagnosed plantar fasciitis was 0.85%. The ratio between males and females showed that females had two and a half times more chance of getting plantar fasciitis. The highest prevalence was found in people between the ages of 45-64 years. The least between the ages of 18-45 years (Nahin, 2018). People aged 50 years and older have a prevalence of 9.6% with complaints of disabling plantar aspect heel pain (Thomas, Whittel, Menz, Rathod-Mistry, Marshall & Roddy, 2019). Plantar fasciitis has a strong association with a five times higher rate in people with a body mass index (BMI) of more than 30, than those with a BMI less than 25 (Nahin, 2018). In athletes, especially runners, plantar fasciitis has a prevalence of 5-18% resulting in the most common foot-related running injury (Thomas et al., 2019).

2.4 Anatomy of the plantar fascia

On the foot's plantar aspect, the plantar fascia runs the whole length of the foot and can be described as a robust connective tissue structure. The fascia originates (its proximal attachment) as a thick fibrous aponeurosis on the calcaneus's medial tubercle. This thick

fibrous aponeurosis extends out and inserts (distal attachment) into the metatarsal heads' short and deep transverse ligaments. The aponeurosis divides into five digital bands, extending further to form the sheath on the toes' plantar aspect. This sheath is a fibrous flexor sheath that straddles the flexor tendons (McNally & Shetty, 2010). At the inferior part of the metatarsal heads, the aponeurosis will reinforce the transverse fibres. Together they will form the superficial transverse metatarsal ligaments.

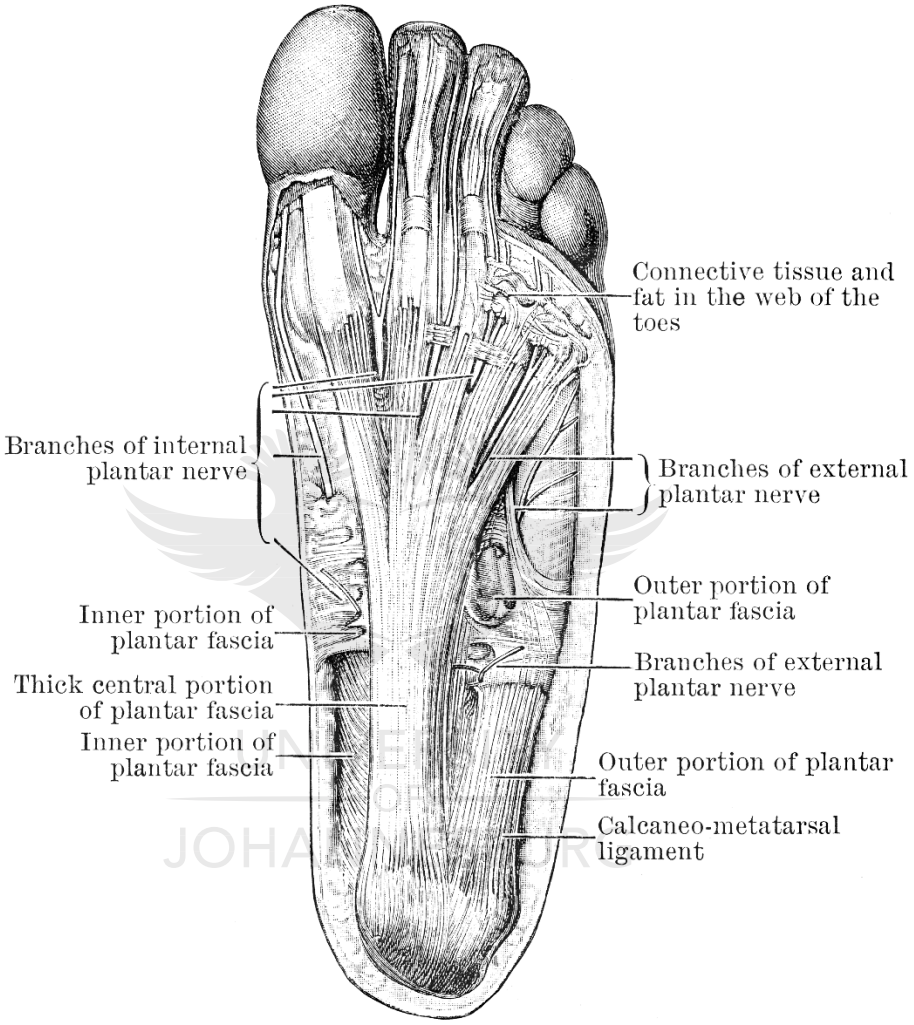

Figure 2.2**:** *Illustration of the plantar fascia (ClipArt ETC, 2021)*

The plantar fascia has three distinctive bands in the mid and forefoot that will create the three compartments of the sole: the medial, lateral, and central fibrous bands (Moore, Dalley & Agur, 2010).

The medial band is the least important band of the three. The medial band originates from the central band's midportion and inserts over the abductor hallucis, flexor hallucis brevis, the tendons of the flexor hallucis longus, and the medial plantar nerve and the associated vessels (McNally & Shetty, 2010). The medial band will join with the deep fascia of the medial aspect of the foot. The medial compartment of the sole is covered by the thinner

medial plantar fascia (Moore et al., 2010).

The lateral bundle can be found underneath the abductor digiti minimi and flexor digiti minimi brevis. The sole's lateral compartment is covered by the thinner lateral plantar fascia (McNally & Shetty, 2010).

The central fibrous band is a critical structure when referring to plantar fasciitis, as it is the static supporter through the arch of the foot and acts as a dynamic shock absorber (Young et al., 2001). The central band originates from the medial tubercle of the os calcis distally and is divided into five separate limbs. Each of these five limbs will blend in with the deep fascia and transverse ligament of the foot. Together they will combine at the metatarsal heads (McNally & Shetty, 2010). The central compartment is covered superficially by dense plantar aponeurosis that contains the following structures: adductor hallucis, flexor digitorum brevis, lumbricals, tendons of the flexor hallucis longus, flexor digitorum longus, quadratus, and the lateral plantar nerve and the associated vessels (Moore et al., 2010).

It is only in the forefoot that the fourth compartment is called the interosseous compartment of the foot. The plantar and dorsal interosseous fascia surround it. The interosseous compartment structures consist of: metatarsal, deep plantar vessels, the plantar, and dorsal interosseous muscles. The vessels of the plantar aspect are located distinctly in the plantar position. All the remaining structures can be found between the dorsal and plantar aspects of the foot. The fifth compartment is called the dorsal compartment of the foot and can be found between the dorsal fascia, the tarsal bones, and the dorsal interosseous fascia of the fore and midfoot. The following structures can be found in this compartment: the extensor digitorum brevis, extensor hallucis brevis and the neurovascular structures of the dorsum of the foot (Moore et al., 2010).

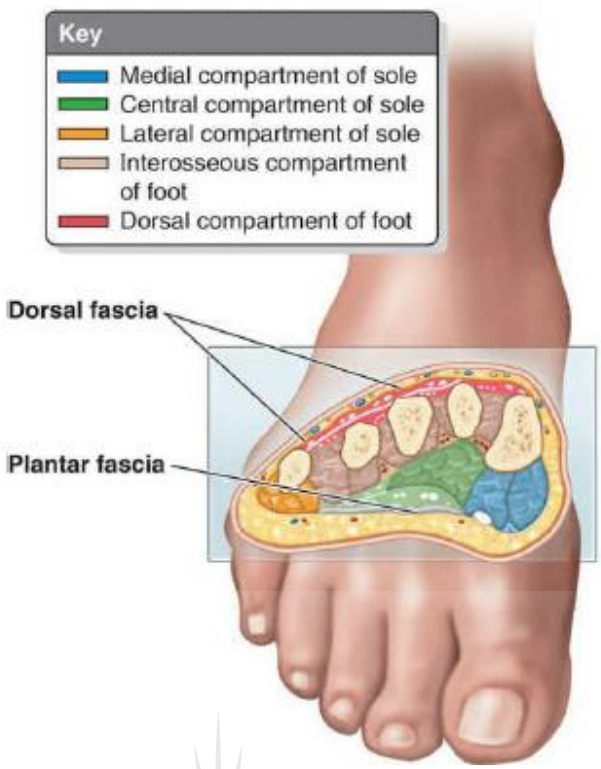

Figure 2.3: *Transverse section of the foot compartments (anterior view) – (Moore et al., 2010)*

The lateral and medial plantar nerves supply the plantar fascia. The superficial fibular nerve supplies the dorsal fascia. The lateral fascia is supplied by the sural nerve and medial fascia by the saphenous nerve (Bourne & Varacallo, 2018).

The plantar fascia's blood supply is supplied by the posterior tibial artery and the dorsalis pedis artery. The posterior tibial artery supplies the foot's plantar aspect fascia, and the dorsalis pedis artery supplies the fascia on the foot's dorsum (Bourne & Varacallo, 2018).

Superficial and deep lymphatic vessels travel through the fascia. The shallow lymphatic vessels will be more prominent medially and unite next to the great saphenous vein. The vessels will drain into the superficial inguinal lymph nodes. The deep lymphatic vessels follow the main blood vessels and drain in the popliteal lymph nodes (Bourne & Varacallo, 2018).

2.5 Biomechanical functions of the plantar fascia

The plantar fascia has the function of preventing foot collapse due to its anatomical orientation and tensile strength (Bolgla & Malone, 2004). The plantar fascia has the

function of dividing multiple muscles into compartments that have both static and dynamic functions. These compartments are responsible for influencing the foot's physiological process, influencing the muscles' shape, and optimising movement and part of the nerves and blood vessels in the area (Bourne & Varacallo, 2018).

The fascia also has a mechanical function. It acts as a shock absorber that will provide a soft, supportive, and balanced cushion for pedal movement (Bourne & Varacallo, 2018).

2.5.1 The windlass mechanism

The windlass mechanism is used to describe the plantar fascia's critical role in dynamic support in weight-bearing activities, including biomechanical factors and stresses (Bourne & Varacallo, 2018).

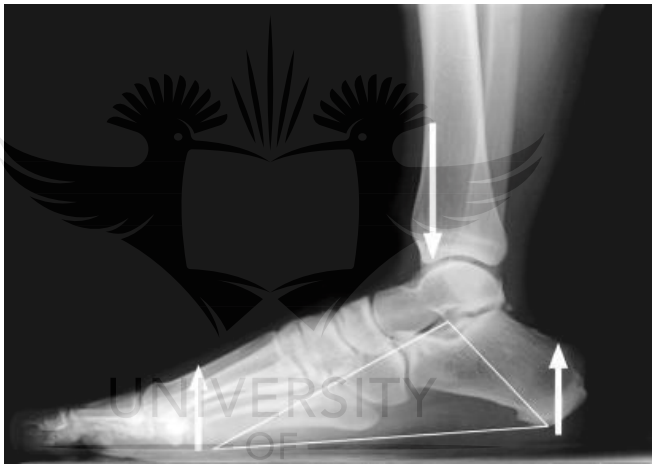

Figure 2.4: *Arch like triangular structure (Bourne & Varacallo, 2018)*

The foot can be described as an arch-like triangular structure. This triangular structure is formed by the calcaneus, metatarsal (also called the medial longitudinal arch), and the midtarsal joint. The plantar fascia includes the link between the calcaneus and the phalanges. The link can be called a tie-rod joining these two structures (Bourne & Varacallo, 2018).

Bodyweight exerts a vertical force downwards via the tibia and will flatten as it reaches the medial longitudinal arch. The ground reaction force exerts upward pressure on the calcaneus and metatarsal heads. The pressure will further diminish the flattening effect as both these forces fall anterior and posterior to the tibia (Bourne & Varacallo, 2018).

The triangle in Figure 2.4 demonstrates the triangular arch-like structure formed by the calcaneus, metatarsals, and midtarsal joint. The horizontal line indicates the plantar fascia. The upwards arrow is the ground reaction force, and the downwards arrow is the body's vertical force. As shown in Figure 2.4 above, the ground and vertical reaction forces orientation can cause a collapse of the arch-like structure. Still, if the plantar fascia tension is increased, it will respond to these forces and maintain the triangular arch-like system (Bourne & Varacallo, 2018).

The word windlass can be described as the tightening of a cable or robe (Bourne & Varacallo, 2018). The plantar fascia pretends to be the cable that is attached between the calcaneus and the metatarsophalangeal joint. During dorsiflexion in the gait cycle's propulsive phase, the plantar fascia will wind around the metatarsal head. This effect will cause a shortening of the distance between the calcaneus and the metatarsals and elevate the medial longitudinal arch. The windlass mechanism principle can be explained by shortening the plantar fascia from the hallux dorsiflexion (Bolgla & Malone, 2004).

2.6 Presenting symptoms of plantar fasciitis

Plantar fasciitis has a history of intense sharp pain upon the first steps in the morning or after a long period of inactivity or activity without weight-bearing, such as sleeping or sitting (Young, 2019). Pain and discomfort will subside within 30-45 minutes. The problem that is experienced is felt on the plantar aspect of the foot. The pain varies, as patients have reported that they experience it over the anterior to the medial calcaneal tuberosity and feel maximum tenderness on palpation (Nicholl, 2008). In some cases, the pain can radiate proximally. Some patients may present with a limp, or they prefer to walk on their toes to ease the pain. The associated symptoms that patients can experience is night pain and paraesthesia. Pain is worsened by walking barefoot, especially on hard surfaces or walking upstairs. Pain decreases with ambulation, but pain increases as activity increases or throughout the day. Dull aching pain is felt in the heel after a long day, especially if the patient was walking or sitting for prolonged hours. Pain is not the only symptom, as plantar fasciitis is also significantly associated with stiffness of the foot and swelling that can be localised to the foot. The duration of a specific activity that a patient intends to do is an excellent guideline to the degree of irritability of the plantar fascia. Athletes, especially runners, experience pain mostly when sprinting (Young, 2019).

2.7 Aetiology of plantar fasciitis

The leading cause of plantar fasciitis may be unclear and may be multifactorial. There is a high incidence in runners, caused by microtrauma. The following are risk factors for plantar fasciitis: pes planus (flat feet), pes cavus (high arches) (Young et al., 2001). Patients with a BMI more than 30, heel spurs (bony osteophytes on the anterior calcaneus), prolonged standing or weight-bearing. The plantar fasciitis risk factors can be divided into extrinsic and intrinsic factors. These two will be discussed in more detail below (Young, 2019).

2.7.1 Extrinsic factors

According to research, one of the major causes of plantar fasciitis can be related to training errors. In general, athletes have a history of increasing their intensity, duration, and distance of their activity. High-risk activity for runners includes hill workouts, plyometrics and increase in speed. Low cushioning for the feet or an unsteady surface is also a risk factor. It is imperative to have the appropriate equipment when training. If athletes spend most of their time on their feet, they should consider the proper footwear. Athletic shoes tend to lose their cushioning very fast and should be kept in mind. Athletes that use lightweight cushioned shoes are also at risk and should consider wearing thicker training flats (Young, 2019).

2.7.2 Intrinsic factors

Structural and anatomical risk factors include excessive femoral anteversion, excessive lateral tibial torsion, leg length discrepancy, and overpronation of the foot (Young et al., 2001).

Excessive femoral anteversion, lateral tibial torsion, and leg length discrepancy will alter the biomechanics of running, which increases the stress on the plantar fascia.

Athletes with low-arched or high-arched feet have a higher risk factor for plantar fasciitis, as it places more significant stress on the plantar fascia with foot strike, as seen in Figure 2.5 below.

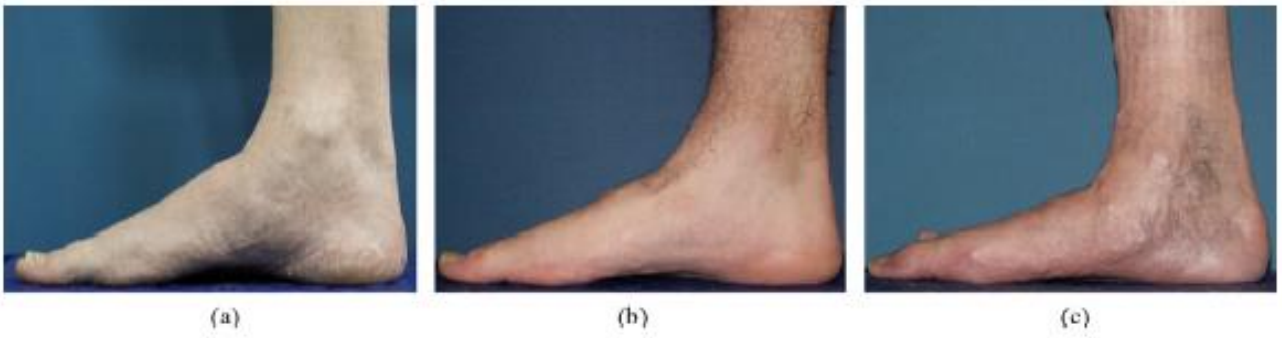

Figure 2.5: *Medial view of the right foot: (a) pes cavus (high-arched), (b) neutrally aligned, normal arch, (c) pes planus (low-arched) (Cowley, Boyko, Shofer, Ahroni & Ledoux, 2008)*

Pronation is a normal motion of the foot, and it is necessary for the unlocking of the foot, making it a flexible structure. Overpronation, however, (see Figure 2.6) will lead to greater tension on the plantar fascia.

Figure 2.6: *Bilateral overpronation of the feet (Fletcher, 2017)*

Functional risk factors include tightness of the Achilles tendon, hamstrings, and soleus muscles, and weakened intrinsic foot muscles. Decreased dorsiflexion of the foot can be an essential risk factor for the condition (Young, 2019).

Heel fat pad atrophy and ageing are risk factors as well and can be classified as degenerative processes.

2.8 Diagnosis and clinical presentation of plantar fasciitis

Diagnoses are determined based on the history of the patient as well as a physical examination. It is imperative to take down an excellent history to rule out any other pathology that can cause heel pain. The following history and physical examination findings which are vital factors in the diagnoses of plantar fasciitis are:

1. Physically inactive individuals with higher body mass index (BMI).
2. Tarsal tunnel syndrome ruled out by a negative tarsal tunnel test.
3. Abnormal Foot Posture Index Score (Martin, Davenport, Reischl, McPoil, Matheson, Wukich, McDonough, Altman, Beattie, Cornwall & Davis, 2014).
4. Pain that is throbbing, piercing, searing, or sharp (Cole, Seto & Gazewood, 2005).
5. Plantar heel pain on the medial side felt most often upon first steps in the morning or after a prolonged period of inactivity like sitting or sleeping.
6. Pain that is aggravated by increased activity (Martin et al., 2014).
7. Discomfort and stiffness that disappears after 30-45 minutes in the morning (Nicholl, 2008).
8. On palpation, there is a tenderness of the origin (proximal attachment) of the plantar fascia (Martin et al., 2014).
9. Range of motion that is limited in dorsiflexion at the talocrural joint.
10. Positive windlass test — the test is used to examine the amount of toe extension in weight-bearing. The first metatarsal is lifted, and the arch is then evaluated. This test will reproduce the pain in the medial calcaneal tubercle (Bolga & Malone, 2004).

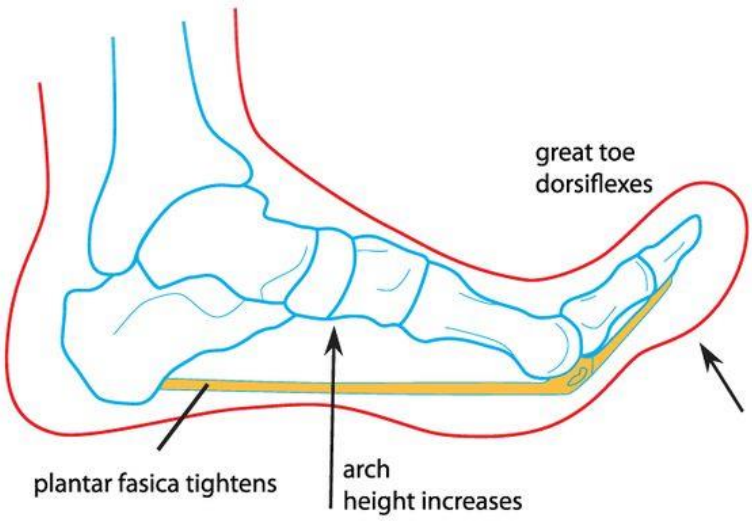

Figure 2.7: *Windlass test (Martin et al., 2014)*

2.9 Special investigations for plantar fasciitis

A special investigation is not required for the diagnosis of plantar fasciitis; however, if the patient has atypical or chronic symptoms, diagnostic imaging or additional special examination can provide a proper diagnosis and treatment plan (Young et al., 2001).

a) Diagnostic ultrasound

Ultrasound is the first-line modality for the diagnosis or assessment of plantar fasciitis. Findings on the sonar reveal nodular thickening associated with fibrillar structure loss and perifascial collections. Complete or partial tears of the plantar fascia fibres can be identified on an ultrasound (Draghi et al., 2017).

Doppler ultrasound reveals hyperaemia of the plantar fascia's perifascial soft tissue near the calcaneus's attachment due to neurovascular growth. Hyperaemia is an indication of why a patient would experience pain symptoms. Hyperaemia can also be associated with the treatment of plantar fasciitis (Draghi, Gitto, Bortolotto, Draghi & Belometti, 2017).

The diagnosis's accuracy can be achieved using real-time sono-elastography due to the less elastic plantar fascia (Draghi et al., 2017).

Figure 2.8: *Ultrasound scan (c), sagittal view of the standard plantar fascia, arrows indicate plantar fascia as a fibrillar ligamentous structure (Draghi et al., 2017).*

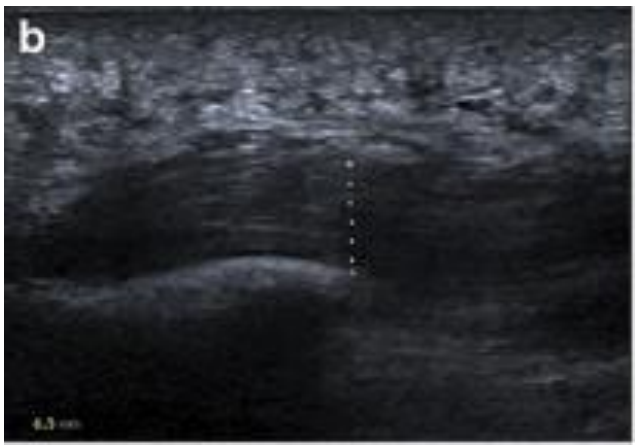

Figure 2.9: *Ultrasound scan, dashed line of 6.5mm indicates plantar fascia thickening as well as the hypoechoic appearance and a pattern of fibrillar loss (Draghi et al., 2017)*

b) Magnetic resonance imaging (MRI)

Magnetic resonance imaging (MRI) is the second-line modality for the diagnosis and assessment of plantar fasciitis. MRI reveals that there is bone marrow oedema and oedema of the soft tissue of the surrounding structures. MRI shows thickening and signal changes in the fascia itself and partial or complete disruption of the plantar fascia fibres (Draghi et al., 2017).

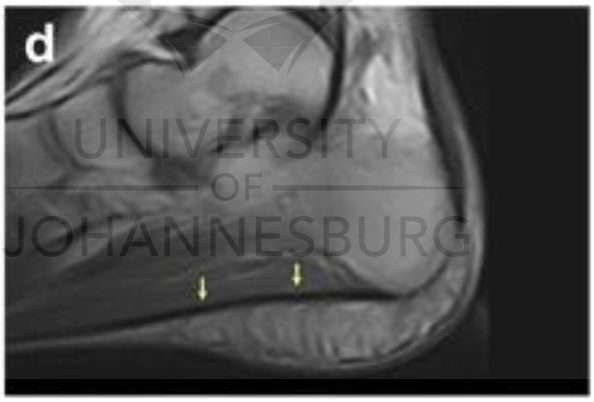

Figure 2.10: *MRI (d) standard plantar fascia (arrows) illustrated as a thin band of low signal intensity on T1-weighted image (Draghi et al., 2017)*

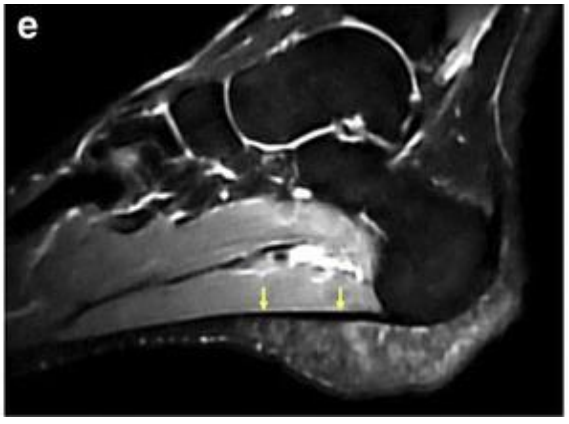

Figure 2.11: *MRI (e) standard plantar fascia (arrows) illustrated as a thin band on a fluid-sensitive image (Draghi et al., 2017)*

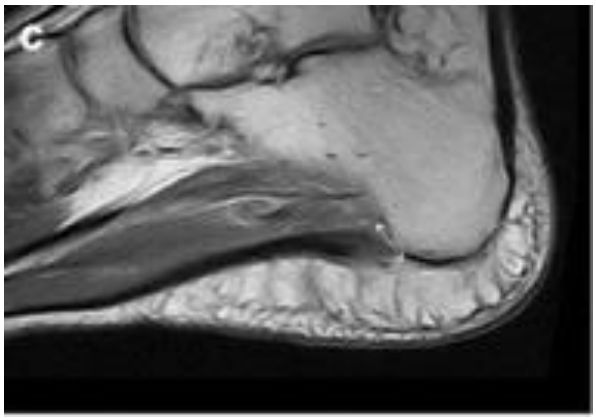

Figure 2.12: *MRI - T1 weighted image (c), the double-headed arrow indicates thickening of the plantar fascia at the calcaneal origin, as well as the intrasubstance region of transitional and high signal intensity (Draghi et al., 2016)*

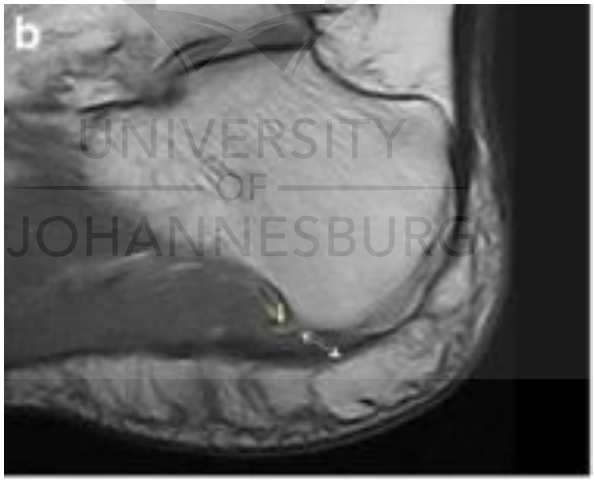

Figure 2.13: *MRI (b). Arrow: Indicates heel (calcaneal) spur. Double-head arrow: Thickening of the plantar fascia origin on the calcaneus (Draghi et al., 2017)*

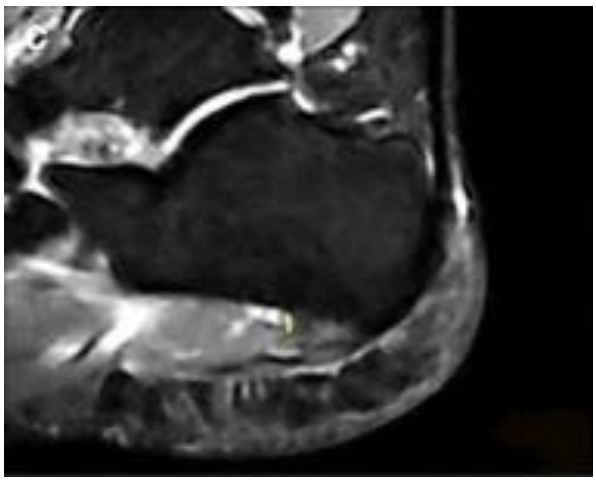

Figure 2.14: *MRI fluid-sensitive image (c). Oedema of the bone marrow in the heel (calcaneal) spur (Draghi et al., 2017)*

2.10 Differential diagnoses for heel pain

Heel pain needs an accurate diagnosis, but it can be difficult due to the region's complex anatomy (Lareau, Sawyer, Wang & DiGiovanni, 2014).

a) Achilles tendinopathy

Achilles tendinopathy is caused by overuse of the calf muscle, wearing high heels, or running.

b) Rupture of the plantar fascia

Acute plantar fascia rupture causes pain at the distal part of the fascia's insertion, accompanied by bruising in the middle of the arch.

c) Heel pad syndrome (Fat pad atrophy)

The fat pad comprises fatty tissue organised and in a specialised confluence of fibrous septae found between the skin and the calcaneus periosteum. The septae undergoes deformation when exposed to loading. Heel pad atrophy can be found in the fifth decade related to a patient's age.

d) Calcaneal apophysitis (Sever's disease)

Calcaneal apophysitis is a common aetiology for heel pain in both children and adults. The disease occurs between the ages of five and eleven years old. The condition is due to bones that grow quicker than the tendons and the muscles, due to repetitive running or jumping activities.

e) Calcaneal stress fracture

Calcaneal stress fractures are the second most common fracture in the foot. The fracture is due to the overloading of the heel. The stress fracture location is found posterior and inferior to the rear facet of the subtalar joint.

f) Nerve entrapment

Nerve entrapment symptoms usually present as numbness, tingling, a burning sensation, and can be caused by overuse, injury from previous surgeries, or related trauma.

g) Tarsal tunnel syndrome

The tarsal tunnel is formed by the medial malleolus, medial calcaneus, posterior talus, and flexor retinaculum. The tarsal tunnel can be described as a fibro-osseous space created by these structures. Through the tunnel runs the posterior tibial nerve. If the nerve is compressed in the tunnel, it can cause neuropathic pain and numbness in the ankle and heel on the posteromedial side.

h) Systemic disorder causing heel pain

Systemic disorder that can cause heel pain are rheumatoid arthritis (RA), gout, seronegative arthritis, reactive arthritis, and ankylosing spondylitis.

2.11 Treatment options for plantar fasciitis

The treatment approach is determined by knowing and understanding the aetiology and pathophysiology of the condition. It is imperative to pay close attention to the patient's history and conduct a physical examination to eliminate all other potential causes and not misdiagnose the heel pain. An essential aspect of the treatment protocol is to use an evidence-based approach to achieve the patient's best possible outcome. A factor to keep in mind is always educating the patient on the expected recovery time (Young, 2019). As we have seen in the literature review, plantar fasciitis is self-limiting and has a 90% resolution rate (Martin et al., 2014). Every patient or individual differs in the pathology's degree and will respond differently to the treatment provided. The treatment approaches are as follows: one system is to treat the contributing factors secondary to the disease process, rather than the mechanical aspect. The course will consist of NSAIDs, analgesics, ice, rest, activity modification, corticosteroids, orthotics, or night splints. In contrast, the second approach is directed to resolve the degeneration that is caused by the pathology. The techniques are designed to generate an acute inflammation reaction. The goal is to initiate a healing response. Such methods include shockwave therapy, cross-friction massage, platelet-rich injections, and surgical procedures. Physical therapy for plantar fasciitis can consist of both approaches for the best possible outcome. If the symptoms persist after six weeks of conservative treatment, it would be best to refer the patient to a foot and ankle specialist (Young, 2019). It is vital for early recognition and diagnosis, leading to a shorter treatment course and increasing the odds of success (Young et al., 2001).

2.12.1 Conservative approached to treating plantar fasciitis

a) Rest and activity modification

A critical part of the treatment of plantar fasciitis is rest. Rest includes activity modification, as complete rest will not be practical, for some patients who present with plantar fasciitis have careers that require them to stand for prolonged periods. Exercise alteration proves to have a higher success rate as it increases the rate of pain alleviation. It is important to have patient compliance in the treatment of plantar fasciitis. If the case is severe with unbearable pain, the patient's foot can be immobilised in a walking boot. 25% of the success rate is due to the patient's compliance for rest and activity modification.

Athletes may only return to their strenuous exercise once the symptoms allow it. Athletes must modify their programs to avoid activities that can aggravate their symptoms. Activity modification can be done by decreasing the intensity, frequency, and amount of training. Most athletes will be compliant in this way, especially, if they can increase non-aggravating activities. The practitioner must give a clear indication of what is expected of the athlete. The practitioner may have to provide the athlete with a strict training regimen if they ignore the advice. The athlete can start by decreasing their activity to 50% of their usual time or distance and gradually increase by 10% per week (Young, 2019).

Recommendations for runners (Young, 2019):

1. Runners who want to run barefoot-style programs must be cautious about the distance and intensities. If they are beginners, they should start slowly.
2. Distance runners must wear flats in training as they are proven to be lighter and have more cushion. In competition, the runner should use less well-cushioned racing flats.
3. Runners with pes planus or overpronation of the feet should wear motion control shoes. The shoes will have board-lasted, straight-lasted, or combined-lasted construction, wider-flare, and extra medial support.
4. Runners with pes cavus should wear shoes that have more generous cushioning.
5. It is crucial to select appropriate training shoes and replace worn-out shoes. It is recommended that runners replace their shoes every 400-800 km if they wish to maintain the ideal shoe cushioning (Young, 2019).

b) Cryotherapy (ice)

Ice works as an anti-inflammatory and can decrease the pain and swelling of the affected area. Ice can be applied after strenuous physical activity. It can be used in the form of an ice pack, ice cube massage, or an ice bath (Young, 2019).

- Application of an ice pack - the ice is placed in a plastic bag and wrapped in a towel. The towel is to prevent any ice burns to the skin. The ice pack is applied for 15-20 minutes to the foot's plantar aspect (Young, 2019).
- Ice cube massage - the patient can freeze water in a plastic bottle or a polystyrene cup. The ice bottle's application is placed on the foot's plantar aspect by rolling over the painful area in a circular motion. Pressure should be dictated by the

tenderness that is present. The application should be for five to ten minutes (Young, 2019).

- Ice bath - a shallow pad can be filled with ice and water. The patient must soak their heel for 10-15 minutes. To prevent any cold injuries, the patient must keep their toes out of the water (Young, 2019).

c) Manipulation

Manipulation can be described as a therapy used to increase a joint's mobility by moving it past its physiological range of motion without destroying the joint structures. Manipulations break fibrous adhesion within the joint. The technique used is a high velocity, low amplitude, short-lever technique (Ernst, 2008).

A study done by Dimou, Brantingham and Wood (2004), compared chiropractic manipulation of the foot and ankle with daily stretching versus custom made orthotics. The study was conducted over one month. The authors noticed a significant improvement in both these groups, but chiropractic manipulation associated with stretching was favoured, as there was a decrease in pain-rating at day 15 (Stuber & Kristmanson, 2006).

d) Stretching and strengthening

Patients must stretch and strengthen their plantar fascia. It affects the functional risk factors such as tightness of the gastrocnemius muscle and weakened intrinsic foot muscles (Young et al., 2001). Research has shown that patients who stretched the plantar fascia showed a reduction in general pain and decreased pain during the first steps in the morning. Plantar fascia stretching, Achilles tendon and gastrocnemius stretches indicate great success in removing pain (Cole et al., 2005).

The various methods of stretching include the following:

Figure 2.15: *Plantar fascia stretch. The patient is advised to sit down and cross the affected foot on the contralateral leg bent, grasp the toes' base, and pull the toes towards the shin until a stretch in the arch is felt. The stretch is held for 10 seconds and repeated three times, but avoiding a painful stretch. This stretch should be performed daily (Cole et al., 2005)*

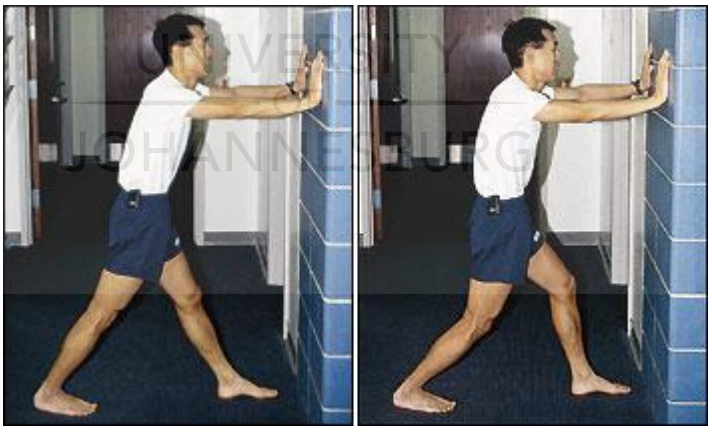

Figure 2.16: *Calf stretch. Illustration one (left) the gastrocnemius stretch. Illustration two (right) soleus stretch (Young et al., 2001)*

Figure 2.17: *Illustration of a slant board or the usage of two-inch x four-inch piece of wood. The slant board can be used for a calf stretch and for individuals to stand on when working in the kitchen or workplace (Young et al., 2001)*

Figure 2.18: *Two-inch x four-inch piece of wood, as explained above (Young et al., 2001)*

Figure 2.19: *Illustration of dynamic stretching with a tin can. Individuals can use a tin can or a tennis ball to roll the plantar fascia (Young et al., 2001)*

Figure 2.20: *Towel stretching (Young et al., 2001)*

Strengthening must focus on the intrinsic foot muscles. Strenghtening include toe taps, towel curls and picking up marbles or coins with the toes.

- Toe taps are achieved by lifting the toes from the floor and keeping the heel on the floor. The second toe to the fifth toe is held in the air while the first toe (big toe) is tapped on the floor repetitively. Movement can also be done by keeping the first toe in the air while the second to fifth toes are repetitively tapped on the floor.
- Towel curls are achieved by being seated on the floor with the heel placed on a flat surface. The towel is pulled towards the body, as seen in Figure 32. Use the toes to curl the towel (Young et al., 2001).
- Marble pickups - patients place a few marbles on the floor near a cup. Patients must attempt to pick the marble up with their toes and drop them into the cup by keeping the heel on the floor. For a more challenging exercise, the patient can substitute the marbles for coins.

Patients should maintain and avoid plantar fasciitis from occurring by doing daily stretch and strengthening exercises two to three times per week (Young, 2019).

e) Taping / Strapping

Literature suggests that anti-pronation taping should be used for up to three weeks to relieve acute plantar fasciitis (Martin et al., 2014). The usage of low-dye taping will assist in support of muscle and ligament function. Taping will decrease the tensile forces placed on the plantar fascia. Low-dye taping is a cost-effective treatment approach (Bolgla & Malone, 2004).

f) Night splints

Night splints are used to keep the ankle in a neutral position overnight. Most individuals sleep with their feet in a plantarflexed position, which could cause a shortening of the plantar fascia. When placed in a night splint, it causes passive stretching of the plantar fascia and the calf. When the plantar fascia is kept in an extended position, it allows for healing. There is less tension or pain in the morning with the first steps (Young et al., 2001).

Figure 2.21: *Illustration of an example of a night splint (Young et al., 2001)*

Disadvantages of night splints include interference with patients' sleep or that of a partner, and mild discomfort (Young et al., 2001).

g) Shoes and Orthotic devices

Recommendations for shoes and orthotics:

1. Shoes that are too small for an individual can exacerbate pain in the feet (Young et al., 2001).
2. Fashionable shoes do not always provide the necessary stability and enough arch support and can aggravate symptoms (Young, 2019).
3. Shoes with a well-cushioned midsole and are thicker and made from high-density materials will assist in pain associated with prolonged standing and walking (Young et al., 2001).
4. Over-the-counter and custom-made orthotics are equally as effective in treating plantar fasciitis (Young, 2019). Still, in one randomised controlled trial done by Baldassin, Gomes and Beraldo (2009), they suggest that ethylene-vinyl acetate prefabricated inserts can be more beneficial than custom-made inserts in uncomplicated plantar fasciitis.

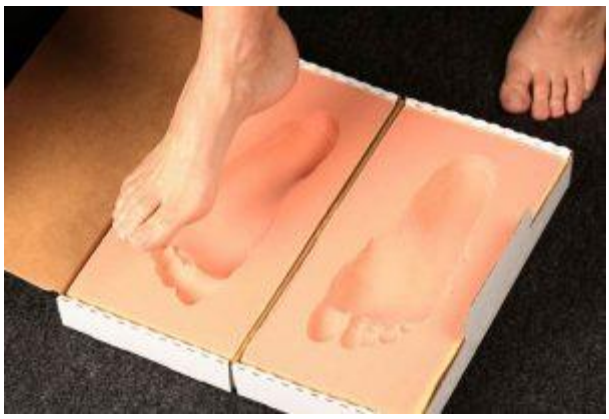

Figure 2.22: *Mould for customisable orthotics (McFarland, 2017)*

Figure 2.23: *Customisable orthotics (McFarland, 2017)*

5. A randomised prospective study by Walther, Kratschmer, Verschl, Volkering, Altenberger, Kriegelstein and Hilgers (2013), found that more supportive orthotics have a more significant reduction in pain than softer, non-supportive orthotics.
6. Whittaker, Landorf, Munteanu, Menz, Tan, and Rabusin (2017) reported in a systemic review that orthotics effectively reduce plantar heel pain in adults.
7. Individuals with pes planus (flat feet) should have shoes that have better longitudinal arch support. This assists in decreasing the pain associated with standing or walking. Motion-control shoes are recommended (Young et al., 2001).
8. Shoes are essential for shock absorption. Shoes lose their capability with age and mileage (Young et al., 2001).
9. Studies have shown that 14% of individuals with plantar fasciitis improve with new shoes (Young et al., 2001).

Figure 2.24: *Arch support with a cushioned heel (Young et al., 2001)*

h) Cross friction massage

Cross friction massage can be described as the movement and pressure directed across the tissue (Hammer & Levy, 2007). Cross friction massage is used for the chronic overuse of soft tissue injuries such as the tendons, muscles, and ligaments. Cross friction massage aims to break down scar tissue and adhesions as well as preventing them from forming. The effects of hyperaemia caused by cross friction massage can decrease the pain by releasing histamine. The massage is applied to the specific tissue in a transverse, longitudinal direction. Cross friction massage must be applied to the particular tissue in a transverse, longitudinal direction. The massage application must be parallel to the tissue to improve the return of fluid and increase the circulation in the area. The practitioner's fingers and the patient's skin must move as one unit (Hammer & Levy, 2007).

Figure 2.25: *Cross friction massage of the plantar fascia (Young et al., 2001)*

i) Instrument assisted soft tissue mobilisation (IASTM)

IASTM uses stainless-steel instruments precisely designed when used manually to brush over an affected area, affecting the myofascial restriction, scar tissue, and adhesions (Maartens, 2005). The advantages of IASTM are a reduction in pain and an improvement of function and range of motion. It is theorised that this technique works the same as cross friction massage but will attain quicker results by allowing a greater depth of penetration and more specific treatment method. The method also allows for less stress on the practitioner's hands (Cheatham, Lee, Cain & Baker, 2016). A study done by Maartens (2005), concluded that the use of instrument-assisted soft tissue mobilisation for the treatment of plantar fasciitis was successful in restoring the mobility of the fascia, which in turn allowed for an increase in load-bearing.

j) Shockwave therapy

Shockwave therapy can be described as a non-invasive, non-surgical treatment approach. The treatment is applied straight to the injured tissue through the skin by using high-pressure wave pulsations. Shockwave therapy may either use an electromagnetic pulse or pressurized air (Wang, 2012). Shockwave therapy has successfully treated chronic disorders such as plantar fasciitis, lateral epicondylitis, and calcific tendinitis. The action mechanism includes the stimulation of blood flow, increasing the immune response and release of nutrients – introducing microtrauma to stimulate healing, and switches the neurological pain pathway off through the pulses hitting the affected nerves. Shockwave induces immediate analgesic and anti-inflammatory effects and assists in the long-term regeneration of the area (Cole et al., 2005).

k) Surgery

According to Miyamoto, Takao and Uchio (2010), only five to ten per cent of plantar fasciitis cases need surgery. Surgery should be reserved for patients who did not respond to six to twelve months of conservative treatment. Plantar fasciitis surgery (fasciotomy) removes the entire fascia or only a part of it. This procedure's downfall is that it causes instability of the medial column of the foot and the lateral column of the foot will be overloaded and can cause pain (Malay, Pressman, Assili, Kline, York, Buren, Heyman, Borowsky & LeMay, 2006). Bazaz and Ferkel (2007) prove that patients with less severe

symptoms respond the best to the surgical procedure. The surgery's complications include flattening the longitudinal arch (50% chance) and hypoesthesia (Bazaz & Ferkel, 2007).

2.13 Chiropractic profession

According to the World Health Organisation, the chiropractic definition is as follows: "A health care profession concerned with the diagnosis, treatment and prevention of disorders of the neuromusculoskeletal system and the effects of these disorders on general health. There is an emphasis on manual techniques, including joint adjustment or manipulation, with a particular focus on subluxations (World Health Organization, 2005)." In addition to spinal manipulation, chiropractors use other modalities such as electrotherapy, heat, ice and dry needling as mentioned above. They also advise patients on weight loss, supplementation usage and lifestyle changes as part of activity modification (Ernst, 2008).

2.14 Podiatry profession

Podiatry is classified as a specialised field in assessing and evaluating the lower leg, foot and ankle for musculoskeletal dysfunction, mechanical foot problems, gait analysis, underlying systemic and local disease (Dziedzic & Hammond, 2010). Podiatrists use a comprehensive knowledge of each patient's condition to assess the risk factors and provide the most effective and economic outcome for each patient regarding mobility improvement (Janisse & Coleman, 2008). Podiatrists can use local and regional anaesthesia to treat foot and ankle conditions (Woodburn & Turner, 2010).

Chapter Three

Materials and methodology

3.1 Study design

The study made use of a non-experimental, quantitative, and cross-sectional data design using a structured and recorded questionnaire. The questionnaire was designed on

Question Pro and distributed via email link to evaluate chiropractors and podiatrists' perception in managing plantar fasciitis.

3.1.1 Sampling procedure and selection criteria

Assistance was sought from Chiropractic Association of South Africa (CASA) and Podiatry Association of South Africa (PASA) to distribute the email link for the questionnaire to all the registered chiropractors and podiatrists in South Africa. Participants needed to open the link, and it directed them to an independent website. The participants were asked to read through the Information and Consent Form. The participants needed to agree to the form by submitting their approval by clicking on the "Agree and continue with the Survey" button. When participants agreed they were then directed to the questionnaire.

Since the respective associations distributed the questionnaire on the researcher's behalf, no personal information was disclosed. All participants who completed the questionnaire were anonymous. No identifying data were asked to ensure anonymity.

3.1.2 Inclusion and exclusion criteria

Inclusion criteria

- All chiropractic participants must be qualified and registered at the CASA.
- All podiatry participants must be qualified and registered at the PASA.
- Participants must be between the ages of 24-80 years.

3.2 Data analysis

3.2.1 Methods of measurement

a) Self-administered questionnaires (Data Collection Instrument)

The questionnaire (see Appendix A) was a self-administered and adapted version based on a similar study done by Ferdinand et al (2014) comparing the perception of physiotherapists and podiatrists in the management of plantar fasciitis. Questions were adapted by the researcher with assistance from STATKON to ensure the questions and structure aligned with Ferdinand et al's (2014) study. The process was to ensure the reliability of the questionnaire. The research did provide more information on the most

common methods used between chiropractors and podiatrists on the treatment of plantar fasciitis, whereas Ferdinand et al's (2014) study gave more information about the most common methods used by physiotherapists and podiatrists.

3.3 Sampling method

The study sample consisted of the registered chiropractors of CASA and all the registered podiatrists of PASA. The total number of registered chiropractors at CASA stood at 575, and the total number registered podiatrists at PASA stood at 117. CASA and PASA were sought for assistance in the distribution of the survey link. CASA sent out the email link for all the registered chiropractors and PASA for podiatrists. The link redirected the practitioner to an independent website to complete the information letter, consent form and the online survey. The practitioner needed to click on the "Agree and continue with the Survey" button after reading the information letter and consent form. They agreed it signified their consent to partake in the study. The link redirected the participant to the online survey for completion. A total of 100 completed responses shared between chiropractors and podiatrists was necessary for the research to be valid and reliable.

3.4 Data analysis

Data was collected using an online questionnaire designed using Question Pro. The data were analysed with the aid of a statistician based at the University of Johannesburg's Statistical Consultation Services Department. The Statistical Package for the Social Sciences (SPSS) was used for data analysis. The analysis included frequency, and custom tables. Chi-Square Tests of Independence were performed to measure associations between chiropractors' and podiatrists' perceptions, with other categories of variables measured in the questionnaire to investigate plantar fasciitis treatment. The frequency tables were used to analyse single response questions. Custom tables were used to analyse multiple response questions. Finally, it was the responsibility of the researcher to interpret the results and ensure completeness.

Chapter Four

Results

4.1 Introduction

The data was analysed with the aid of the Statistical Consultation Services Department at the University of Johannesburg (STATKON). SPSS programming was used. The data were presented as frequency tables, custom tables, and Chi-Square Tests of Independence. Frequency tables were used to analyse single response questions for averages and standard deviations. Custom tables were used to analyse multiple response questions. Finally, Chi-Square tests of Independence were performed to measure associations between chiropractors' and podiatrists' perceptions with other categories of variables measured in the questionnaire to investigate the treatment of plantar fasciitis. The stats presented below determined the similarities and differences in the perception of, and the most common treatment methods for plantar fasciitis between chiropractors and podiatrists.

4.2 Response analysis

The questionnaire was distributed to 575 chiropractors and 117 podiatrists resulting in a total number of 692. The response rate was 23.84%. Only 105 questionnaires were valid and reliable for data analysis. 60 of the 165 Questionnaires were discarded due to incorrect answering of questions. Question 9 was set for chiropractors only, but some podiatrists also filled in the question and vice versa for Question 10 which was only meant for podiatrists. For that reason, 60 questionnaires were not valid, and only 105 questionnaires were used for subsequent analysis.

4.3 Frequency tables

4.3.1 Profession

Table 4.1: Frequency table displaying profession

Profession	N	Valid percentage
Chiropractic	69	65.7%
Podiatry	36	34.3%

Out of 105 respondents, (n=69) was identified as chiropractors and (n=36) as podiatrists.

4.3.2 Gender

Table 4.2: Frequency table displaying gender

Gender	N	Valid percentage
Male	35	33.3%
Female	70	66.7%

In Table 4.2 displayed above, (n=35) respondents were male, and (n=70) were female.

4.4 Cross-table

4.4.1 Cross-table displaying a comparison between profession and gender

Table 4.3: Cross-table displaying a comparison between profession (Q1) and gender (Q3)

			Chiropractic	Podiatry	Total
Gender	Male	Count	23	12	35
		% within Q3	65.7%	34.3%	100.0%
		% within Q1	33.3%	33.3%	33.3%
	Female	Count	46	24	70
		% within Q3	65.7%	34.3%	100.0%
		% within Q1	66.7%	66.7%	66.7%
Total		Count	69	36	105
		% within Q3	65.7%	34.3%	100.0%
		% within Q1	100.0%	100.0%	100.0%

Table 4.3 displayed above, out of 69 chiropractors, (n=23) were male, and (n=46) were female. The total amount of podiatrists was 36, made up of (n=12) males and (n=24) females. The total number of chiropractors and podiatrists were captured at 105.

4.5 Participant response

4.5.1 Number of years chiropractors and podiatrists are practising (Q2)

Table 4.4: Summary table displaying the number of years Chiropractors and Podiatrists are practising.

Number of years each profession is practising	**Chiropractic**	**Podiatry**
Mean	6.62	13.42
Standard deviation	7.451	13.785
Minimum	0	1
Maximum	25	60

As seen in Table 4.4, chiropractors who completed the survey were currently practising for an average of 6.62 years and podiatrists on an average of 13.42 years.

4.5.2 The number of sessions used to treat plantar fasciitis (Q11)

Table 4.5 The number of sessions used to treat plantar fasciitis.

Amounts of sessions used to treat plantar fasciitis	**Chiropractors**	**Podiatrists**
Mean	5	3.14
Standard deviation	1.789	1.417
Minimum	2	1
Maximum	12	9

In Table 4.5, chiropractors use 5 sessions on average to treat plantar fasciitis compared to podiatrists, who only use 3.14 sessions.

4.5.3 Number of patients treated in the previous 12 months for plantar fasciitis (Q4)

Table 4.6: Number of patients treated in the last 12 months for plantar fasciitis

Number of patients treated in the previous 12 months for plantar fasciitis	**Chiropractors**	**Podiatrists**
Mean	7.25	48.78
Standard deviation	8.004	30.819
Minimum	0	5
Maximum	30	99

Displayed above in Table 4.6, podiatrists on average, have seen more plantar fasciitis patients (n=48.78) in the last 12 months compared to chiropractors who have only seen an average of n=7.25 patients.

4.5.4 The main management methods for chiropractors (Q9) and podiatrists (Q10) for treating plantar fasciitis according to each profession individually

Question 9 was only applicable to Chiropractors. Chiropractors were asked to select all the suitable management methods for treating plantar fasciitis. Question 10 was only relevant to Podiatrists. Podiatrists were asked to select all the applicable management methods for treating plantar fasciitis. Both question 9 and 10 had the same content in the question.

Table 4.7: Custom table displaying the main management methods for chiropractors and podiatrists.

Management method	**Profession**	**No n (%)**	**Yes n (%)**
Manipulation of the ankle joint	Chiropractors	2 (3.0%)	65 (97.0%)
	Podiatrists	22 (75.9%)	7 (24.1%)
Joint mobilisation	Chiropractors	2 (2.9%)	66 (97.1%)

	Podiatrists	20 (66.7%)	10 (33.3%)
Soft tissue mobilisation	Chiropractors	1 (1.5%)	65 (98.5%)
	Podiatrists	22 (68.8%)	10 (31.3%)
Rest	Chiropractors	10 (15.9%)	53 (84.1%)
	Podiatrists	4 (11.4%)	31 (88.6%)
Compression	Chiropractors	32 (55.2%)	26 (44.8%)
	Podiatrists	5 (16.1%)	26 (83.9%)
Ultrasound	Chiropractors	26 (44.8%)	32 (55.2%)
	Podiatrists	14 (45.2%)	17 (54.8%)
Instrumental-assisted soft tissue mobilisation (Fascial release tools)	Chiropractors	8 (12.7%)	55 (87.3%)
	Podiatrists	25 (86.2%)	4 (13.8%)
Cross Friction massage	Chiropractors	11 (17.5%)	52 (82.5%)
	Podiatrists	27 (93.1%)	2 (6.9%)
Extracorporeal shockwave therapy	Chiropractors	12 (19.4%)	50 (80.6%)
	Podiatrists	18 (54.5%)	15 (45.5%)
Infrared	Chiropractors	40 (70.2%)	17 (29.8%)
	Podiatrists	21 (72.4%)	8 (27.6%)
Dry needling	Chiropractors	19 (31.7%)	41 (68.3%)
	Podiatrists	26 (89.7%)	3 (10.3%)
Laser	Chiropractors	32 (57.1%)	24 (42.9%)
	Podiatrists	21 (70%)	9 (30%)
Acupuncture	Chiropractors	43 (75.4%)	14 (24.6%)
	Podiatrists	27 (93.1%)	2 (6.9%)
Taping / Strapping	Chiropractors	6 (9.2%)	59 (90.8%)
	Podiatrists	0 (0%)	35 (100%)
Calf stretching	Chiropractors	4 (6.1%)	62 (93.9%)
	Podiatrists	1 (2.8%)	35 (97.2%)
Activity modification advice	Chiropractors	6 (9.2%)	59 (90.8%)
	Podiatrists	0 (0%)	35 (100%)
Custom orthotics	Chiropractors	43 (71.7%)	17 (28.3%)
	Podiatrists	0 (0%)	36 (100%)
Night splints	Chiropractors	52 (91.2%)	5 (8.8%)

	Podiatrists	8 (22.9%)	27 (77.1%)
Arch support orthoses	Chiropractors	41 (68.3%)	19 (31.7%)
	Podiatrists	2 (5.9%)	32 (94.1%)
Advice on new shoes	Chiropractors	15 (23.8%)	48 (76.2%)
	Podiatrists	0 (0%)	36 (100%)
Heel cups/pads	Chiropractors	43 (71.7%)	17 (28.3%)
	Podiatrists	4 (12.1%)	29 (87.9%)
Cryotherapy	Chiropractors	11 (17.7%)	51 (82.3%)
	Podiatrists	15 (46.9%)	17 (53.1%)
Thermotherapy	Chiropractors	24 (41.4%)	34 (58.6%)
	Podiatrists	16 (51.6%)	15 (48.4%)
Ball rolling	Chiropractors	5 (7.9%)	58 (92.1%)
	Podiatrists	2 (5.9%)	32 (94.1%)
Advice on weight loss	Chiropractors	8 (12.5%)	56 (87.5%)
	Podiatrists	4 (11.1%)	32 (88.9%)
Steroid injection	Chiropractors	51 (91.1%)	5 (8.9%)
	Podiatrists	20 (60.6%)	13 (39.4%)
Other (non-surgical treatments only)	Chiropractors	36 (85.7%)	6 (14.3%)
	Podiatrists	11 (61.1%)	7 (38.9%)

The five treatment methods listed below, used by chiropractors as seen in Table 4.7, were favoured the most by chiropractors over podiatrists:

- Cross friction massage.
- Instrumental assisted soft tissue mobilisation (fascial release).
- Manipulation of the ankle joint.
- Joint mobilisation.
- Soft tissue mobilisation.

The five treatment methods listed below, used by podiatrists according to Table 4.7 above, which were favoured the most by podiatrists over chiropractors:

- Custom orthotics.
- Arch support orthoses.
- Heel cups/pads.
- Night splints.

- Compression.

The five methods listed below are the methods agreed by both chiropractors and podiatrists in the management of plantar fasciitis:

- Activity modification advice.
- Rest.
- Calf stretching.
- Taping/Strapping.
- Ball rolling.

The five methods listed below are the methods chiropractors and podiatrists agree on to use the least to treat Plantar fasciitis:

- Acupuncture.
- Other (non-surgical treatment only).
- Steroid injections.
- Infrared.
- Laser.

4.6. Cross-tables and Chi-squares

4.6.1 The percentage of patients referred between chiropractors and podiatrists

Participants had to indicate the percentage of how many patients they have referred in past 12 months to a chiropractor (if they were a podiatrist) and to a podiatrist (if they were a chiropractor).

Table 4.8: Cross-table displaying the percentage of patients referred between Chiropractors and Podiatrists.

Percentage of patients referred in the last 12 months between Chiropractors and Podiatrists	Chiropractors (valid percentage)	Podiatrists (valid percentage)	P-value

0%	34.8%	55.6%	p=0.196
25%	37.7%	30.6%	
50%	14.5%	11.1%	
75%	5.8%	2.8%	
100%	7.2%	0%	

As can be seen in Table 4.8, 34.8% of chiropractors and 55.6% of podiatrists referred none of their patients in the last 12 months. 37.7% of chiropractors and 30.6% of podiatrists referred 25% of their patients during the previous 12 months. Less than 10% of chiropractors and podiatrists referred more than 75% of their patients to each other.

Fisher's exact test was completed to test the significance of different treatment methods reported by chiropractors and podiatrists. The probability-value (p-value) is significant if it is equal to or less than 0.05. The higher the p-value, the less deviation between both professions' opinions on the treatment method. The p-value of 0.196 is relatively small, meaning both disciplines do not necessarily agree on when they refer their patients for inter-professional assistance.

The participants were asked to select the most applicable personal limitation to their knowledge, presented in the table below, which limited their ability to treat plantar fasciitis.

4.6.2 Personal limitation to treat plantar fasciitis.

Table 4.9: Cross-table and Chi-square displaying personal limitation to treat plantar fasciitis (Q6).

Personal limitations to treat plantar fasciitis	**Chiropractors (Valid percentage)**	**Podiatrists (Valid percentage)**	**Pearson Chi-square**
Difficulty in differentiating between plantar fasciitis and other conditions presenting with heel pain: e.g., Achilles tendinopathy, ruptured plantar fascia, heel pad syndrome (fat pad atrophy),	8.7%	2.8%	p=0.181

calcaneal apophysitis (Sever's disease), calcaneal stress fracture, L4-S2 radiculopathy, tarsal tunnel syndrome, and systemic disorder (rheumatoid arthritis, gout, seronegative arthritis, reactive arthritis and ankylosing spondylitis).			
Factors that alter the biomechanics of the foot and ankle e.g., Intrinsic foot muscle weakness, excessive femoral anteversion, excessive lateral tibial torsion, leg length discrepancy and overpronation of the foot.	30.4%	16.7%	
Difficulty in identifying the contributing factors in altered biomechanics, e.g., Poor core stability, neural problems and weakened gluteus muscles.	7.2%	8.3%	
Lack of equipment to treat plantar fasciitis.	15.9%	11.1%	
No personal limitations.	37.7%	61.1%	

The results obtained from Table 4.9 above clearly show that the highest response from chiropractors and podiatrists was gained from 'no limitation', yet podiatrists were more likely to choose this option. Secondly, more than a quarter of chiropractors (30.4%) reported their limit was due to 'factors that alter the foot and ankle's biomechanics'. In contrast, less than a quarter of podiatrists (16.7%) reported the same as their limit.

The Pearson Chi-square test was completed to test the significance of different treatment methods reported by chiropractors and podiatrists. The probability-value (p-value) is significant if it is equal to or less than 0.05. The higher the p-value, the less deviation between both professions' opinions on the treatment method. The p-value of 0.181 is

relatively small, meaning both disciplines do not necessarily agree on having the same personal limitation.

The participant was asked to select the most applicable service limitation to their knowledge, presented in the table below, which limited their ability to treat plantar fasciitis.

4.6.3 Service limitation to treat plantar fasciitis

Table 4.10: Cross-table and Chi-square displaying service limitation to treat plantar fasciitis (Q7).

Service limitation to treat plantar fasciitis	**Chiropractors (Valid percentage)**	**Podiatrists (Valid percentage)**	**Pearson Chi-square**
Patients are not seen frequently enough for the treatment period provided by the practitioner.	33.3%	25%	p=0.623
Referral for management was too late.	5.8%	13.9%	
Necessary equipment for the management is not available.	8.7%	2.8%	
Waiting period for the initial assessment of patients was too long.	15.9%	13.9%	
Referring patients to other practitioners for assistance in managing plantar fasciitis, e.g., chiropractor, podiatrist or steroidal injections.	2.9%	5.6%	
Lack of guidance in the management of plantar fasciitis.	5.8%	8.3%	
No service limitations.	27.5%	30.6%	

There was a close relationship between two different service limitations to treat plantar fasciitis. As illustrated above in Table 4.10, more than a quarter of chiropractors (33.3%) and podiatrists (25%) responded that their service limitation was due to 'patients who are not seen frequently enough for the treatment period provided by the practitioner.' Secondly, 27.5% of chiropractors and 30.6% of podiatrists confirmed that they experience 'no service limitation to treat the condition'.

The Pearson Chi-square test was completed to test the significance of different treatment methods reported by chiropractors and podiatrists. The probability-value (p-value) is significant if it is equal to or less than 0.05. The higher the p-value, the less deviation between both professions' opinions on the treatment method. The p-value of 0.623 is relatively significant, meaning both disciplines agree on having the same service limitation.

4.6.4 Comparison between profession and effective management methods for plantar fasciitis.

Table 4.11: Cross-table & Chi-Square displaying a comparison between profession (Q1) and effective management methods for plantar fasciitis (Q5)

Description	Option	Chiropractic	Podiatry	Pearson Chi-Square
Manipulation of the ankle joint	No	2 (3%)	18 (60%)	p=0.000
	Yes	64 (97%)	12 (40%)	
Joint mobilisation	No	6 (9.4%)	10 (32.3%)	p=0.005
	Yes	58 (90.6%)	21 (67.7%)	
Soft tissue mobilisation	No	3 (4.5%)	8 (25.8%)	p=0.002
	Yes	64 (95.5%)	23 (74.2%)	
Rest	No	7 (11.9%)	6 (18.2%)	p=0.404
	Yes	52 (88.1%)	27 (81.8%)	
Compression	No	36 (72%)	11 (35.5%)	p=0.001
	Yes	14 (28%)	20 (64.5%)	
Ultrasound	No	29 (59.2%)	12 (37.5%)	p=0.056
	Yes	20 (50%)	20 (50%)	

Instrument- assisted soft tissue mobilisation (Fascial release-tools)	No	6 (10%)	18 (62.1%)	p=0.000
	Yes	54 (90%)	11 (37.9%)	
Cross friction massage	No	15 (27.3%)	16 (53.3%)	p=0.017
	Yes	40 (72.7%)	14 (46.7%)	
Extracorporeal shockwave therapy	No	14 (27.5%)	8 (25.8%)	p=0.871
	Yes	37 (72.5%)	23 (74.2%)	
Infrared	No	39 (88.6%)	25 (39.1%)	p=0.757
	Yes	5 (11.4%)	4 (13.8%)	
Dry needling	No	19 (38.8%)	17 (58.6%)	p=0.089
	Yes	30 (61.2%)	12 (41.4%)	
Laser	No	35 (77.8%)	16 (55.2%)	p=0.040
	Yes	10 (22.2%)	13 (44.8%)	
Acupuncture	No	39 (90.7%)	22 (75.9%)	p=0.086
	Yes	4 (9.3%)	7 (24.1%)	
Taping/Strapping	No	11 (18%)	3 (8.3%)	p=0.189
	Yes	50 (82%)	33 (91.7%)	
Calf stretching	No	7 (11.1%)	2 (5.6%)	p=0.355
	Yes	56 (88.9%)	34 (94.4%)	
Activity modification advice	No	4 (6.3%)	0 (0%)	p=0.139
	Yes	59 (93.7%)	33 (100%)	
Custom orthotics	No	17 (31.5%)	0 (0%)	p=0.000
	Yes	37 (68.5%)	36 (100%)	
Night splints	No	36 (80%)	19 (57.6%)	p=0.032
	Yes	9 (20%)	14 (42.4%)	
Arch support orthoses	No	23 (44.2%)	3 (8.6%)	P=0.000*
	Yes	29 (55.8%)	32 (91.4%)	
Advice on new shoes	No	4 (7.1%)	0 (0%)	p=0.106
	Yes	52 (92.9%)	35 (100%)	

Heel cups/pads	No	27 (54%)	11(34.4%)	p=0.082
	Yes	23 (46%)	21 (65.6%)	
Cryotherapy	No	10 (17.9%)	14 (45.2%)	p=0.006
	Yes	46 (82.1%)	17 (54.8%)	
Thermotherapy	No	28 (62.2%)	16 (55.2%)	p=0.547
	Yes	17 (37.8%)	13 (44.8%)	
Ball rolling	No	3 (4.8%)	4 (11.8%)	p=0.203
	Yes	60 (95.2%)	34 (35.1%)	
Advice on weight loss	No	15 (28.3%)	6 (17.1%)	p=0.229
	Yes	38 (71.7%)	29 (82.9%)	
Steroid injection	No	27 (60%)	13 (43.3%)	p=0.156
	Yes	18 (40%)	17 (56.7%)	
Other (non-surgical treatments only)	No	31 (77.5%)	16 (59.3%)	p=0.110
	Yes	9 (22.5%)	11 (40.7%)	

The Pearson Chi-square test was completed to test the significance of different treatment methods reported by chiropractors and podiatrists. The probability-value (p-value) is significant if it is equal to or less than 0.05. The higher the p-value, the less deviation between both professions' opinions on the treatment method.

There were non-significant differences between chiropractors and podiatrists on 17 of the 27 treatments. The treatment methods below have the highest probability of being used by both chiropractors and podiatrists. The following techniques showed the smallest differences between the groups:

- Extracorporeal shockwave therapy (p=0.871).
- Rest (p=0.404).
- Calf stretching (p=0.355).
- Advice on weight loss (p=0.229).

The treatment methods listed below have the least probability to be used by either of the two disciplines.

- Infrared (p=0.757)
- Thermotherapy (p=0.547)
- Steroid injections (p=0.156)
- Other (non-surgical treatments only) (p=0.110)
- Acupuncture (p=0.086)

The five treatment methods below have the highest probability of being used to different extents by Chiropractors and Podiatrists. In these treatment methods listed below, one of the professions may favour the method, whereas the other does not. The treatment methods below have the largest difference between the two disciplines.

- Manipulation of the ankle joint (p=0.000)
- Instrumental- assisted soft tissue mobilisation (fascial release) (p=0.000)
- Arch support devices (p=0.000)
- Custom orthotics (p=0.000)
- Compression (p=0.001)
- Soft tissue mobilisation (p=0.002)
- Cryotherapy (p=0.006)

4.6.5 Perception of treatment methods allocated to specific profession

***Table 4.12**: Cross table & Chi-Square compares the profession (Q1) and treatment methods allocated to a specific profession (Q8)*

Treatment methods	Profession	Do not know	Chiropractors only	Podiatrists only	Either Chiropractors or Podiatrists	Neither Chiropractors nor Podiatrists	p -value
Manipulation of the ankle joint	Chiropractic	0 (0%)	64 (92.8%)	1 (1.4%)	4 (5.8%)	0 (0%)	p=0.000
	Podiatry	1 (2.9%)	21 (21%)	0 (0%)	12 (35.3%)	0 (0%)	
Joint mobilisation	Chiropractic	1 (1.5%)	39 (57.4%)	2 (2.9%)	26 (38.2%)	0 (0%)	p=0.911
	Podiatry	0 (0%)	20 (57.1%)	1 (2.9%)	14 (40%)	0 (0%)	
Soft tissue mobilisation	Chiropractic	1 (1.4%)	29 (42%)	1 (1.4%)	38 (55.1%)	2 (5.9%)	p=0.302
	Podiatry	1 (29%)	14 (41.2%)	1 (2.9%)	16 (47.1%)	0 (0%)	
Rest	Chiropractic	1 (1.4%)	3 (4.3%)	1 (1.4%)	61 (88.4%)	3 (4.3%)	p=0.657
	Podiatry	0 (0%)	1 (2.9%)	1 (2.9%)	32 (34.4%)	0 (0%)	

Compression	Chiropractic	4 (5.9%)	6 (8.8%)	2 (2.9%)	53 (77.9%)	3 (4.4%)	p=0.039
	Podiatry	0 (0%)	1 (2.9%)	6 (17.1%)	25 (71.4%)	3(8.6 %)	
Ultrasound	Chiropractic	0 (0%)	40 (58%)	2 (2.9%)	25 (36.2%)	2 (2.9%)	p=0.000
	Podiatry	0 (0%)	5 (14.7%)	6 (17.6%)	17 (50%)	6 (17.6%)	
Instrument-assisted soft tissue mobilisation (Fascial release-tools)	Chiropractic	0 (0%)	53 (76.8%)	2 (2.9%)	14 (20.3%)	0 (0%)	p=0.003
	Podiatry	5 (14.3%)	20 (57.1%)	0 (0%)	8 (22.9%)	2 (5.7%)	
Cross friction massage	Chiropractic	0 (0%)	46 (66.7%)	1 (1.4%)	21 (30.4%)	1 (1.4%)	p=0.024
	Podiatry	3 (8.8%)	22 (64.7%)	0 (0%)	6 (17.6%)	3 (8.8%)	
Extracorporeal shockwave therapy	Chiropractic	1 (1.5%)	40 (58.8%)	1 (1.5%)	26 (38.2%)	0 (0%)	p=0.000
	Podiatry	1 (2.9%)	6 (17.6%)	3 (8.8%)	19 (55.9%)	5 (14.7%)	
Infrared	Chiropractic	4 (6.1%)	25 (37.9%)	1 (1.5%)	34 (51.5%)	2 (3%)	p=0.021
	Podiatry	3 (9.1%)	9 (27.3%)	2 (6.1%)	12 (36.4%)	7 (21.2%)	
Dry needling	Chiropractic	1 (1.5%)	57 (83.8%)	1 (1.5%)	6 (8.8%)	3 (4.4%)	p=0.065
	Podiatry	0 (0%)	22 (62.9%)	0 (0%)	10 (28.6%)	3 (8.6%)	
Laser	Chiropractic	4 (6%)	26 (38.8%)	2 (3%)	34 (50.7%)	1 (1.5%)	p=0.038
	Podiatry	2 (5.9%)	9 (26.5%)	2 (5.9%)	15 (44.1%)	6 (17.6%)	
Acupuncture	Chiropractic	7 (10.3%)	32 (47.21%)	0 (0%)	9 (13.2%)	20 (29.4%)	p=0.169
	Podiatry	3 (8.6%)	20 (57.1%)	0 (0%)	8 (22.9%)	4 (11.4%)	
Taping/ Strapping	Chiropractic	0 (0%)	22 (32.4%)	0 (0%)	45 (66.2%)	1 (1.5%)	p=0.000
	Podiatry	0 (0%)	2 (6.1%)	5 (15.2%)	26 (78.8%)	0 (0%)	
Calf stretching	Chiropractic	0 (0%)	6 (8.7%)	1 (1.4%)	61 (88.4%)	1 (1.4%)	p=0.017
	Podiatry	0 (0%)	0 (0%)	5 (14.3%)	30 (85.7%)	0 (0%)	
Activity modification advice	Chiropractic	0 (0%)	5 (7.4%)	2 (2.9%)	61 (89.7%)	0 (0%)	p=0.012
	Podiatry	1 (2.9%)	0 (0%)	6 (17.6%)	27 (79.4%)	0 (0%)	
Custom orthotics	Chiropractic	0 (0%)	2 (2.9%)	52 (75.4%)	12 (17.4%)	3 (4.3%)	p=0.014
	Podiatry	0 (0%)	0 (0%)	36 (100%)	0 (0%)	0 (0%)	

Night splints	Chiropractic	2 (2.9%)	2 (2.9%)	47 (68.1%)	15 (21.7%)	3 (4.3%)	p=0.603
	Podiatry	1 (2.8%)	0 (0%)	23 (63.9%)	8 (22.2%)	4 (11.1%)	
Arch support orthoses	Chiropractic	1 (1.5%)	2 (2.9%)	51 (75%)	12 (17.6%)	2 (2.9%)	p=0.292
	Podiatry	0 (0%)	0 (0%)	33 (91.7%)	2 (5.6%)	1 (2.8%)	
Advice on new shoes	Chiropractic	0 (0%)	3 (4.3%)	8 (11.6%)	56 (81.2%)	2 (2.9%)	p=0.000
	Podiatry	0 (0%)	0 (0%)	30 (83.3%)	6 (16.7%)	0 (0%)	
Heel cups/pads	Chiropractic	1 (1.4%)	1 (1.4%)	36 (52.2%)	30 (43.5%)	1 (1.4%)	p=0.282
	Podiatry	0 (0%)	0 (0%)	26 (72.2%)	9 (25%)	1 (2.8%)	
Cryotherapy	Chiropractic	1 (1.5%)	5 (7.4%)	2 (2.9%)	60 (88.2%)	0 (0%)	p=0.000
	Podiatry	3 (8.8%)	2 (5.9%)	4 (11.8%)	18 (52.9%)	7 (20.6%)	
Thermotherapy	Chiropractic	1 (1.4%)	6 (8.7%)	2 (2.9%)	59 (85.5%)	1 (1.4%)	p=0.002
	Podiatry	3 (9.1%)	2 (6.1%)	0 (0%)	21 (63.6%)	7 (21.2%)	
Ball rolling	Chiropractic	0 (0%)	6 (8.7%)	3 (4.3%)	58 (84.1%)	2 (2.9%)	p=0.284
	Podiatry	0 (0%)	0 (0%)	1 (2.9%)	32 (91.4%)	2 (5.7%)	
Advice on weight loss	Chiropractic	0 (0%)	6 (8.7%)	2 (2.9%)	59 (85.5%)	2 (2.9%)	p=0.113
	Podiatry	0 (0%)	0 (0%)	1 (2.9%)	30 (85.7%)	4 (11.4%)	
Steroid injection	Chiropractic	5 (7.5%)	0 (0%)	18 (26.9%)	5 (7.5%)	39 (58.2%)	p=0.395
	Podiatry	3 (8.6%)	0 (0%)	15 (42.9%)	2 (5.7%)	15 (42.9%)	
Other (non-surgical treatments only)	Chiropractic	27 (51.9%)	3 (5.8%)	0 (0%)	15 (28.8%)	7 (13.5%)	p=0.043
	Podiatry	13 (46.4%)	0 (0%)	4 (14.3%)	9 (32.1%)	2 (7.1%)	

In Table 4.12, the Pearson Chi-square test was completed to test the significance of different treatment methods reported by chiropractors and podiatrists. The probability-value (p-value) is significant if it is equal to or less than 0.05. The higher the p-value, the less deviation between both professions' opinions on the treatment method.

The six treatment methods below all have the same probability value of p-0.000. The below-mentioned methods are the ones that both professions agree on, according to their perception for who is responsible for using the treatment method to manage plantar fasciitis:

- Manipulation of the ankle joint (p=0.000).
- Ultrasound (p=0.000).
- Extracorporeal shockwave therapy (p=0.000).
- Taping/Strapping (p=0.000).
- Advice on new shoes (p=0.000).
- Cryotherapy (p=0.000).

The five treatment methods below all have a probability value of bigger than p-0.302. The below-mentioned methods are the ones that both professions least agree on, according to their perception for who is responsible for using the treatment method to manage plantar fasciitis:

- Joint mobilisation (p=0.911).
- Rest (p=0.657).
- Night splints (p=0.603).
- Steroid injections (p=0.395).
- Soft tissue mobilisation (p=0.302).

Arch support devices (p=0.292), ball rolling (p=0.284) and heel cups/pads also have a high probability value where the two professions least agreed on.

Chapter Five

Discussion

5.1 Introduction

The following chapter will be a discussion about the results obtained in Chapter four. The results presented will help distinguish between the most common treatment methods for plantar fasciitis and inter-professional perception between chiropractors and podiatrists. The results allowed the researcher to achieve the aim of the study. Results presented indicate that there is a vast difference between chiropractors and podiatrists in their perception of the management for plantar fasciitis and their role as practitioners.

5.2 Response analysis

The questionnaire was distributed to 575 chiropractors and 117 podiatrists resulting in a total number of 692. A total number of 100 completed questionnaires was required as the sample group, for the survey to be reliable and valid. The response rate was 23.84%. Only 105 questionnaires were accurate and reliable for the purposes of data analysis. 60 of the 165 Questionnaires were discarded due to incorrect answering of questions. Question 9 was set for chiropractors only, but some podiatrists also filled in the question and vice versa for Question 10 which was only meant for podiatrists. For that reason, 60 questionnaires were not valid.

The distribution of the survey was conducted via an email link. The questionnaire was available to complete for more than two months to ensure maximum participation from both chiropractors and podiatrists. The questionnaire was distributed to CASA and PASA members multiple times (three). A low response rate was due to the anonymity of the survey, since it was not possible to follow up with participants telephonically or to encourage participants to complete it. Another contributing factor which could have affected the response rate was the accuracy of the databases used to distribute the survey, as participants did not update their contact details with their respective associations. The low response rate could also have been because of electronic filters which place the survey link in the participants' spam box of their email.

This study was based on a study done by Ferdinand et al (2014), entitled "a survey comparing the perceptions of physiotherapists and podiatrists in the management of plantar fasciitis", which included 230 physiotherapists and 227 podiatrists in England, resulting in 457 completed questionnaires. The survey was distributed through the Society of Musculoskeletal Medicine and the Society of Podiatrists and Chiropodists (Ferdinand et al., 2014).

5.3 Demographics

The demographical questions in the survey were asked to determine the aspects which may influence the participants' responses, interests, opinions and perceptions. The demographic data allowed for cross-tabulation of the data.

The gender distribution between chiropractors and podiatrists was 66.7% females and 33.3% males. There are no current data available on the gender distribution in these two

professions in South Africa, but a study done in the United States suggests that most chiropractors are male (Johnson & Green, 2012), compared to the podiatry profession in the United States which concluded that 66% are female and 34% male. The sample group consisted of 65.7% chiropractors and 34.3% podiatrists.

5.4 Participants' response on patient numbers and sessions use for the management of plantar fasciitis

On average, podiatrists have seen more plantar fasciitis patients (48.78) in the last 12 months compared to chiropractors who have only seen an average of 7.25 patients. In the study done by Ferdinand et al (2014), 71% of podiatrists reported seeing more than 20 patients in a year compared with only 13% of physiotherapists seeing 20 patients per annum.

Chiropractors use five sessions on average to treat plantar fasciitis compared to podiatrists, who only use 3.14 sessions. According to a study done by Dimou et al (2004), chiropractors use foot and ankle manipulation twice a week for four weeks and a one-month follow-up; this is accompanied by a stretch program twice a day for eight weeks, provided for the patient to do at home to treat plantar fasciitis. 2500 patients treated by podiatrists for plantar fasciitis at a Foot and Ankle Institute received three to four treatment sessions a week for approximately six weeks. If the initial patient's symptoms reoccurred, they continued the treatment until the symptoms resolved (Baravarian & Chandler, 2013).

5.5 Treatment methods preference by each profession

The next few paragraphs will discuss the treatment methods which were favoured by chiropractors over podiatrists:

5.5.1 Cross friction massage

According to this study 82.5% of chiropractors preferred cross fiction massage over 6.9% of podiatrists. As can be seen, compared to the study in the Canadian Chiropractic Association Journal, chiropractors use cross-friction massage as a phase- two treatment plan for plantar fasciitis. The association suggested that cross- friction massage should be used hand-in-hand with manual manipulation. This approach will restore the muscle

length and joint movement. As the patient improves, they apply myofascial treatment to the plantar fascia, fibularis longus/brevis, tension fascia lata, tibialis anterior, and the iliotibial band. The cross-friction massage was then applied to the fascia (Costa & Dyson, 2007).

5.5.2 Instrumental assisted soft tissue mobilisation (Fascial release)

As seen in this study, 87.3% of chiropractors preferred instrumental assisted soft tissue mobilisation over 13.8% of podiatrists. According to the American Chiropractic Association Journal, Graston technique is a successful soft-tissue treatment method for plantar fasciitis used by chiropractors (Forcum, Hyde, Aspegren & Lawson, 2010). Chiropractors and physicians extensively use it to reduce pain and improve range of motion limitation caused by scar tissue and musculoskeletal injuries. A systemic review of plantar heel pain focused on the efficacy of and patient outcome for the Graston technique. They found that the Graston Technique is popular among patients. Patients do not need any medication and can fully recover with manual therapy after only a few weeks of treatment. The Graston technique is said to be a non-invasive holistic treatment plan (Mckivigan & Tulimero, 2020).

5.5.3 Manipulation of the ankle joint

As evident in this study, 97% of chiropractors preferred manipulation of the ankle joint over 24% of podiatrists. According to Meyer, Kulig and Landel (2002), four patients participated in a study where they received manual therapy which included subtalar joint distraction manipulation, talocrural joint posterior glide, anterior/posterior glide of the first tarsometatarsal joint, and subtalar joint lateral glides. All four patients reported that they had an improvement in function and a relief of pain symptoms in a period of one to three months. These above-mentioned techniques provide short-term relief for one to three months (Meyer et al., 2002).

5.5.4 Joint mobilisation

According to this study, 98.5% of chiropractors preferred joint mobilisation over 33.3% of podiatrists. Hains, Boucher and Lamy (2015), conducted a study where Group A of 31 plantar fasciitis patients from a private clinic received 15 experimental treatments consisting of mobilisation of the foot's articulations and ischaemic compression of the trigger joint. Group B consisted of 10 patients, using prefabricated soft insoles, and was observed for five weeks before receiving 15 experimental treatments. The outcome was measured with a Foot Functional Index (FFI) and a perceived improvement scale (PIS). Group A had a substantial decrease in symptoms for all the follow-up evaluations. A decline in symptoms lasted for up to six months from the initial follow-up. The paper concluded that ischaemic compression and joint mobilisation should be used for chronic plantar fasciitis (Hains et al., 2015).

5.5.5 Soft tissue mobilisation

As evident in this study, 98.5% of chiropractors preferred soft tissue mobilisation over 31.3% of podiatrists. Plantar fasciitis is a recurring musculoskeletal condition. 87.2% of patients along their course of treatment received manual therapy from 2007 to 2011. The evidence regarding soft tissue mobilisation is increasing. Patients who received manual therapy are said to visit their practitioner less and thus had a lower cost of care (Fraser, Glaviano & Hertel, 2017).

Meyer et al (2002) discuss patients who receive active and passive mobilisation in conjunction with soft tissue mobilisation along the median nerve course to treat plantar fasciitis.

The next few paragraphs will discuss the treatment methods which were favoured by podiatrists over chiropractors:

5.5.6 Custom orthotics

According to this study, 100% of podiatrists preferred custom orthotics over 28.3% of chiropractors. Custom orthotics are said to decrease foot pronation which caused excessive stress on the fascia's medial band. Kitaoka, Luo, Kura and An (2002) tested

custom orthotics on cadaver specimens. The result showed a reduction in strain on the fascia during static loading. There is also a reduction in the foot's elongation caused by excessive pronation and reduces the foot's medial longitudinal arch (Kitaoka et al., 2002).

5.5.7 Arch support orthoses

As evident in this study, 94.1% of podiatrists preferred arch support orthoses over 31.7% of chiropractors. According to Young et al's (2001) study, arch support devices which can be purchased over the counter are useful in acute plantar fasciitis and mild pes planus. These arch supportive devices are made up of variable material. Adolescent patients tend to use more over the counter arch support orthoses as their feet have already reached full growth. They would only require a new pair of orthoses once or twice per season. Patients prefer to use soft enough material that would be comfortable walking in (Young et al., 2001).

5.5.8 Heel cups/pads

As evident in this study, 87.9% of podiatrists preferred heel cups/pads over 28.3% of chiropractors. According to a study done by McPoil, Martin, Cornwall, Wukich, Irrgang and Godges (2008), 236 plantar fasciitis patients took part in a randomised trial. Patients were recruited from orthopaedic foot and ankle clinics. Group 1 was dedicated to calf-stretching only. Group 2 had calf-stretching and silicone heel pads as treatment. Group 3 had arch felt inserts and calf-stretching and lastly, Group 4 had calf-stretching and a rubber heel cup. The trial concluded that patients who used prefabricated inserts like silicone pads, rubber heel cups, or arch felt inserts had a notably better outcome than patients who received custom orthotics. There is currently no evidence suggesting that prefabricated orthotics or custom orthotics work for periods more extended than one year to restore function and pain management (McPoil et al., 2008).

5.5.9 Night splints

According to this study, 77.1% of podiatrists preferred night splints over 8.8% of chiropractors. According to the review "Heel pain: Plantar fasciitis" conducted by McPoil et al (2008), night splints should be considered for plantar fasciitis when patients'

symptoms persist for longer than six months. The night splints should be worn for a time-frame of one to three months. There are different types of night splints which include anterior, posterior, or sock-type. No evidence indicates that different types of night splints affect the treatment outcome (McPoil et al., 2008).

5.5.10 Compression

In this study, 83.9% of podiatrists preferred compression over 44.8% of chiropractors. Hains et al (2015) conducted a study where Group A consisted of 31 plantar fasciitis patients from a private clinic, who received 15 experimental treatments consisting of mobilisation of the foot's articulations and ischaemic compression of the trigger joint. Group B consisted of 10 patients, using prefabricated soft insoles. The participants were observed for five weeks before receiving 15 experimental treatments. The outcome was measured with a Foot Functional Index (FFI) and the perceived improvement scale (PIS). Group A had a substantial decrease in symptoms for all the follow-up evaluations. A decline in symptoms lasted for up to six months from the initial follow-up. The paper concluded that ischaemic compression and joint mobilisation should be used for chronic plantar fasciitis (Hains et al., 2015).

The next few paragraphs will discuss the treatment methods which were favoured by both chiropractors and podiatrists in the management of plantar fasciitis:

5.5.11 Activity modification advice

As evidenced in this study, 90.8% of chiropractors and 100% of podiatrists agreed that they would use activity modification advice for treating plantar fasciitis. According to a study done in 2014 (Rathleff, Mølgaard, Fredberg, Kaalund, Andersen, Jensen, Aaskov & Olesen, 2015), 48 patients with plantar fasciitis were divided into 3 groups. Daily specific stretching vs shoe inserts vs high-load strength training, an advanced exercise protocol performed every second day. There was a more significant self-reporting outcome after three months compared to plantar-specific stretching. Reduction in pain and improved function can be achieved using high-load strength training using unilateral heel raises with a towel inserted under the toes (Rathleff et al., 2015).

According to Lim, How and Tan (2016), a multidisciplinary approach is useful if the plantar fascia load is reduced. Activity modification can be achieved by changing the athlete's or individual's training regimen by altering the distance, intensity, and duration. Machinery like a stationary bike or an elliptical machine should be used instead, until the symptoms resolve (Lim et al., 2016).

5.5.12 Rest

As evident in this study, 84.1% of chiropractors and 88.6% of podiatrists agreed that they would advise their patients on taking rest for treating plantar fasciitis. Hull University Teaching Hospital brought out a plantar fasciitis leaflet for patient education. They educate patients on the necessary aetiology, symptoms, causes, and treatment options available. According to the leaflet, complete rest must be avoided and is not advisable, but they explain that the fascia strain must be taken off for early healing stages. The following feet position should be obtained: only performed to the patient's tolerance of pain, ten times, for three to four times per day: in a seated position, the feet should be lifted a few centimetres off the surface of the floor, pulling the toes and ankle up towards the patient, and then pointing them away. The patient should move the ankles in a circular motion. These steps should be repeated ten times for three to four sessions a day.

5.5.13 Calf-stretching

According to this study, 93.9% of chiropractors and 97.2% of podiatrists agreed that they would use calf-stretching for treating plantar fasciitis. According to a study by Porter, Barrill, Oneacre and May (2002), 50 patients with plantar fasciitis were included in the study, where 40 patients performed intermittent stretches, and 41 served as the control group. Patients needed to stretch their calf muscles at the end of a step with their heel hanging off the step. The patients were instructed to keep their foot in a neutral position. The stretch was held for 20-second intervals, twice a day. At the end of the four-month trial, the participant's ankle dorsiflexion improved, and there was a reduction in pain (Porter et al., 2002).

5.5.14 Strapping/Tapping

In this study, 90.8% of chiropractors and 100% of podiatrists agreed that they would use strapping/tapping for treating plantar fasciitis. According to Hyland, Webber-Gaffney, Cohen and Lichtman (2006), calcaneal taping is used to invert the calcaneus, which in turn improves the biomechanics of the foot. Patients in their study, were divided into sham taping, calcaneal taping, calf-stretching and a control group. After one week, the sham taping and calf-stretching group had a reduction in pain. The calcaneal taping group showed significant improvement in pain symptoms, greater than that of the previous two groups mentioned above (Hyland et al., 2006).

Low-dye taping was used for pain reduction and function improvement. In a study by Radford, Landorf, Buchbinder and Cook (2006), 92 patients were divided equally into two groups. One group received low-dye taping with sham ultrasound, and Group two only received sham ultrasound. The participants had their feet taped for an average of 7 days. Patients in Group one reported that they had a decrease in pain on the first steps. Low-dye taping and calcaneal taping can be used to relieve symptoms and restore function for 7-10 days (Radford et al., 2006).

5.5.15 Ball rolling

According to evidence from this study, 92.1% of chiropractors and 94.1% of podiatrists agreed that they would use ball rolling for treating plantar fasciitis. According to Schwartz and Su (2014), ball rolling should be considered as part of patient education and patient responsibility for homework. The plantar fascia can be rolled with a ball or a can. It should be done before going to bed at night and before taking the first steps in the morning. The fascia must be rolled for at least one minute, three times with 30 seconds of rest between each set (Schwartz & Su, 2014).

The following few paragraphs will discuss the treatment methods to use the least to treat plantar fasciitis as agreed on by chiropractors and podiatrists:

5.5.16 Acupuncture

Findings from this study show that 75.4% of chiropractors and 93.1% of podiatrists agreed that they would not use acupuncture for treating plantar fasciitis. Acupuncture's efficacy is quite limited for the treatment of plantar fasciitis according to a few research articles. A previous study (Roxas, 2005) used 11 patients, comparing acupuncture with electrical stimulus. Acupuncture was applied once a week for 3-6 weeks. There was a reduction in pain rating from 5.7 to 3.0 on average on a 10-point analogue scale (Roxas, 2005).

5.5.17 Other (non-surgical treatment only)

As found in this study, 85.7% of chiropractors and 61.1% of podiatrists agreed that they would not use other (non-surgical treatment only) for treating plantar fasciitis. 27 different treatment methods were provided to the participants to choose from, and they had to decide which ones they used or did not use. For this option of 'other (non-surgical treatment only)', they had to name the "other" methods they used. Unfortunately, no participants gave the methods that they preferred for this option.

5.5.18 Steroid injections

According to this study's findings, 91.1% of chiropractors and 72.4% of podiatrists agreed that they would not use steroid injections for treating plantar fasciitis. In a study conducted in 2018 by Buchanan, Benjamin and Kushner which included 158 patients diagnosed with chronic plantar fasciitis, the patients were split up into four groups: prolotherapy, extracorporeal shockwave therapy, platelet-rich plasma injection, and corticosteroid injection. At the end of the study, no noticeable effect was noted in the first three months. Shockwave therapy worked in the first six months in the reduction of pain. The corticosteroid injection's effectiveness was lost during the follow-up period of 36 months (Buchanan, Benjamin & Kushner, 2017).

5.5.19 Infrared

As evident in this study, 70.2% of chiropractors and 72.4% of podiatrists agreed that they would not use infrared for treating plantar fasciitis. A plantar fasciitis study by Reeboonlap, Satitsmithpong, Phisitkul and Charakorn (2012) was conducted with 70 patients. They

divided them into an NSAIDS, Achilles tendon stretching group and a group the same as Group one, with infrared as an addition. The pain symptoms were measured at the initial consultation, as well as after six months post-treatment. The conclusion was that infrared is safe and easy to use for plantar fasciitis (Reeboonlap et al., 2012).

5.5.20 Laser

In this study, 57.1% of chiropractors and 70% of podiatrists agreed that they would not use laser for treating plantar fasciitis. According to a review on plantar fasciitis by Stuber and Kristmanson (2006), two groups were compared with one receiving a low-intensity laser, and a control group receiving an inactive laser. The authors of the study concluded that laser therapy is an ineffective treatment method for plantar fasciitis as the results were no better than that of the control group (Stuber & Kristmanson, 2006).

In conclusion, of the 20 treatment methods provided above, chiropractors and podiatrists have strong opinions as to which treatment methods they favour for treating plantar fasciitis. According to the statistics provided above, there is a vast difference between chiropractors and podiatrists in their management approach for plantar fasciitis, but there is also a close correlation between chiropractors and podiatrists on their opinions about the most commonly used treatment methods. Both these professions (Chiropractic and Podiatry) tend to stick to their scope of practice when treating plantar fasciitis. For this reason, it is important for chiropractors and podiatrists to have a close inter-professional relationship when they are treating plantar fasciitis.

5.6 Inter-professional referral

The data for inter-professional referral to each other reveal that chiropractors tend to guide more of their patients to podiatrists than vice versa. Nevertheless, there is still a close relationship between these two professions when treating this condition. As the findings from this study indicate, at least 25% of patients get referred for assistance to chiropractors or podiatrists. According to Ferdinand et al's (2014) study, only 33% of podiatrists refer their patients to physiotherapists, in contrast to the 80% of physiotherapists who refer their patients to podiatrists (Ferdinand et al., 2014).

5.7 Personal limitation to treat plantar fasciitis

First, this study has established that 45.7% of the sample group of chiropractors and podiatrists had no personal limits to treat plantar fasciitis. Secondly, the findings indicate that 25.7 % of the group reported that their limitation was biomechanics altered in the foot and ankle. In the study by Ferdinand et al (2014) it was found that similarly, podiatrists and physiotherapists also had more than 50% responses on no personal limits to treat plantar fasciitis. Additionally, in the study between podiatrists and physiotherapists, they reported that their second highest limitation to treat was due to altered biomechanics in the foot and ankle. It is clear that between these three professions, at least half of them have no personal limitation and a quarter of them indicate these limitations are due to a change in the biomechanics of the foot and ankle (Ferdinand et al., 2014). Bridgen and Smith (2008) explain in their research that podiatrists have more extensive knowledge of the foot and ankle's biomechanics. In contrast, physiotherapists have more experience with the rest of the body (Bridgen & Smith, 2008).

5.8 Service limitation to treat plantar fasciitis

A quarter of the chiropractors and podiatrists agreed that they had no service limitation to treat plantar fasciitis. Secondly, more than a quarter of chiropractors and podiatrists had service limitation due to patients not being frequently seen for the treatment period provided. Practitioners need to provide their patients, primary care providers, colleagues, and physical therapists with the necessary information regarding plantar fasciitis. Patients should be educated on the aetiology and treatment program for the condition; even if the condition is self-limiting or different in every patient. The biggest problem is that patients choose to live with symptoms as they cannot pay out-of-pocket costs. Some patients do not have the time for continuous and extended treatment sessions over a longer period (Fraser et al., 2017). The study by Ferdinand et al (2014) concluded that podiatrists and physiotherapists had more service limitations due to patients being referred too late to them for treatment, and in addition, more than 50 % had no service limitation to treat the condition (Ferdinand et al., 2014).

5.9 Perception of successful treatment methods

The differences in opinion of treatment methods were first identified when comparing chiropractors' and podiatrists' perceptions of the most effective treatments for plantar fasciitis. The most significant and most considerable differences occurred where more chiropractors preferred manipulation of the ankle joint, instrumental-assisted soft tissue mobilisation, and soft tissue mobilisation. Podiatrists, on the other hand, preferred more arch support devices, custom orthotics, and compression. Compared to Ferdinand et al's (2014) study, podiatrists agreed that they prefer custom foot orthosis and arch support devices. Physiotherapists leaned more to soft tissue mobilisation (Ferdinand et al., 2014). As discussed in Section 5.5 above, regarding treatment methods' preference by each profession, it could be seen that each method mentioned above had significant and valid evidence to support each profession's claim for their method of choice. Podiatrists lean more to the biomechanical aspect of plantar fasciitis, whereas chiropractors tend to treat the affected joints and soft tissue in the areas which cause plantar fasciitis.

The treatment methods with the smallest difference in opinion for plantar fasciitis treatment were as follows: extracorporeal shockwave therapy, rest, calf-stretching and weight loss. According to a study done by Wang (2012), shockwave therapy has a success rate of 34%-88%, and states that most of the research papers done on shockwave therapy have a beneficial and positive effect as it improves function and alleviates pain; Furthermore, he explains that the reoccurrence rate for patients who receive shockwave therapy is only 5%.

As previously discussed, the findings indicated that calf-stretching and rest have a beneficial effect and help manage plantar fasciitis (Wang, 2012). In Ferdinand et al's (2014|) study, both physiotherapists and podiatrists agreed on weight loss as an effective method. Higher body mass index, which is discussed in multiple papers, has been found to be a risk factor for plantar fasciitis (Riddle, Pulisic, Pidcoe & Johnson, 2003).

5.10 Perception of treatment roles

The results of this study show that these two professions were concordant and were supporting specific treatment methods. There was a generous overlap of treatment methods in terms of professional responsibilities. Manipulation of the ankle was clearly stated as a technique only chiropractors used, which was agreed on by both professions. However, arch support devices and night splints were leaning more to the responsibility of the podiatrists. Ultrasound, shockwave therapy, strapping/taping and advice on new shoes were the treatment methods that both disciplines agreed on that was both their responsibilities. When summarised, the study results show that chiropractors' and podiatrists' perceptions of their own and each other's roles can likely differ, but there are many overlapping areas. Treatment responsibility overlapping can be caused by a lack of clarity of understanding of the different roles in the health care system. This has been a primary point of other studies as well as; for example, in Bridgen and Smith's (2008) research, there was a professional overlap of conflict about treatment methods. Overlap was said to happen when one profession overtakes the treatment methods or another profession's specialist role. The secureness over professions' roles in the health care system can cause 'professional tribalism', altering how different disciplines work together and their effectiveness in team dynamics (Bridgen & Smith, 2008). A considerable amount of evidence indicates that in order for health care teamwork to be effective and efficient, disciplines need to agree on their own and other disciplines' roles (McCallin, 2001; Smith & Roberts, 2005). As chiropractors and podiatrists currently disagree on their respective roles in treating plantar fasciitis, it is anticipated that this could affect the effectiveness of the management of plantar fasciitis. Until further evidence reveals the most effective treatment for plantar fasciitis, and which discipline is responsible for providing the treatment, it will be challenging to tackle the differences in perspective.

5.11 Conclusion

This chapter was used to discuss the nature of the results obtained, namely: the most commonly used treatment methods for plantar fasciitis; the perception of treatment roles between two disciplines; and the ways these two professions would treat the condition; and their limitations. The available data was used to draw up comparisons between these two professions. Furthermore, there is substantial correlation with previous studies. In

Chapter six, the conclusion of the research and recommendations for further studies on plantar fasciitis will be given.

Chapter Six

Conclusion and Recommendations

6.1 Introduction

The research study was based on a review done in England by Ferdinand et al (2004) in which they compared the perception of physiotherapists and podiatrists in the management of plantar fasciitis. All the same parameters were used to conduct the study. The questionnaire was adapted to fit the profile of chiropractors instead of physiotherapists. Permission was sought from the authors to use and adjust their survey for this research topic. The survey was distributed to registered chiropractors of CASA and all the registered podiatrists of PASA. The total number of registered chiropractors at the Chiropractic Association of South Africa (CASA) stood at 575, and the total number of registered podiatrists at PASA stood at 117. CASA and PASA were sought for assistance in the distribution of the survey link. The response rate of the survey was 23.84%, compared with Ferdinand et al's (2014) study where 230 physiotherapists and 227 podiatrists answered the survey. This study aimed to explore the similarities and differences in the perception of and the most common treatment methods for plantar fasciitis between chiropractors and podiatrists. Whether the aim was achieved will be discussed below.

6.2 Conclusion

The study shows that chiropractors and podiatrists agree on the following treatment methods to treat plantar fasciitis: activity modification advice, rest, calf-stretching, taping/strapping and ball rolling. Both these professions agree on these treatment methods. Each of the occupations had their opinions on which methods they specifically use for treating plantar fasciitis. Chiropractors agreed that they prefer to use cross friction massage, instrumental assisted soft tissue mobilisation (fascial release), manipulation of

the ankle joint, joint mobilisation, and soft tissue mobilisation. While podiatrists preferred to use custom orthotics, arch support orthoses, heel cups/pads, night splints, and compression. Most chiropractors and podiatrists agreed that they did not have personal limitations or service limitations to treat. Still, a significant number of chiropractors who reported their personal limits to treatment were due to factors that alter the foot and ankle's biomechanics.

In contrast, fewer podiatrists reported the same factors as causing their limitations. We can conclude that podiatrists have more extensive knowledge of the foot and ankle's biomechanics. However, chiropractors and physiotherapists, according to Ferdinand et al (2014) have more experience with the rest of the body. Chiropractors and podiatrists reported that their service limitation was due to 'patients who are not seen frequently enough for the treatment period provided by the practitioner.' This seems to be caused by the fact that patients are not well educated enough about the aetiology of the condition and the time-frame in which treatment has to occur for the healing of plantar fasciitis, whether the condition is self-limiting or long-standing over six months.

The perception of treatment roles could not be well established, as chiropractors and podiatrists disagreed on numerous treatment methods. There is quite a conflict in the over-lapping of the boundaries for each profession's treatment role. It is anticipated that this could negatively affect the effectiveness of the management of plantar fasciitis. Until further evidence reveals the most effective treatment for plantar fasciitis, and which discipline is best responsible for providing the most effective treatment, it will be challenging to tackle the differences in perspective. The perception of treatment roles needs to be addressed to improve a multidisciplinary approach to the best possible outcome for patients with plantar fasciitis.

6.3 Limitations

The following limitations were noted during the research process:

- The research was supported by previous evidence, but the theory on why the perception of treatment roles between chiropractors and podiatrists differs may be inadvertently influenced by the fact that the researcher is a chiropractor. The

results may be biased due to the researcher's experience of treating patients with plantar fasciitis as a chiropractor.

- The response rate was quite limited and the study could have delivered better results if the response rate had been higher. The survey was distributed during the period of the Covid-19 pandemic. A greater response rate could have been achieved if the researcher had been allowed to distribute the survey through the Health Professions Council of South Africa for Podiatrists and the Allied Health professionals Council of South Africa for Chiropractors.
- The Chi-square tests used in the survey needed adequate power to identify an actual difference between chiropractors and podiatrists in their ways of treating plantar fasciitis. At least seven of the 27 treatment methods were found statistically significant. Still, effect sizes in Cramer's value could have been used to determine how significant the difference was to establish the best treatment methods used.
- Only the top 16 treatment methods which were chosen by chiropractors and podiatrists were discussed.
- A treatment method that should have been added to the list was addressing biomechanical problems in the foot and ankle.

6.4 Recommendations

The following recommendations are made for future research studies and to enhance and improve the evidence on plantar fasciitis:

1. A replication of the study that includes physiotherapists. A survey comparing the perceptions of chiropractors, podiatrists and physiotherapists in the management of plantar fasciitis.
2. A survey comparing the perceptions of chiropractors and physiotherapists in the management of plantar fasciitis.
3. Further research can be done on other practitioners involved in treating plantar fasciitis, e.g., doctors and orthopaedic surgeons.
4. Further research can be done to distinguish between acute and chronic plantar fasciitis. This topic has not been researched, and the evidence on it is limited. A qualitative method can be used to explore this topic using interviews and focus groups, as interpreting the reasons for different perceptions could make the research difficult.

5. A systematic review of research available on the treatment methods for plantar fasciitis.
6. A perception study on chiropractors' and physiotherapists' extensive knowledge on the biomechanics of the foot and ankle. As this was a limitation found in the study, it would be a good idea to see where the two disciplines lack knowledge.
7. A survey on runners with plantar fasciitis and the effect on their training regime.
8. The survey provided for the above study was very long and could have been shorter with fewer questions.
9. The survey provided in the study can offer fewer treatment options to choose from to narrow it down to the best treatment methods used.
10. The survey should have provided an opportunity for the participants to name treatment methods used by them.

References

Baldassin, V., Gomes, C.R. and Beraldo, P.S., 2009. Effectiveness of prefabricated and customized foot orthoses made from low-cost foam for non-complicated plantar fasciitis: a randomized controlled trial. Archives of Physical Medicine and Rehabilitation, 90(4), pp.701-706.

Ball, E.M., McKeeman, H.M., Patterson, C., Burns, J., Yau, W.H., Moore, O.A., Benson, C., Foo, J., Wright, G.D. and Taggart, A.J., 2013. Steroid injection for inferior heel pain: a randomised controlled trial. Annals of the Rheumatic Diseases, 72(6), pp.996-1002.

Baravarian, B. and Chandler, L.M., 2013. Comprehensive Plan to Treat Plantar Fasciitis.

Bazaz, R. and Ferkel, R.D., 2007. Results of endoscopic plantar fascia release. Foot & Ankle International, 28(5), pp.549-556.

Bolgla, L.A. and Malone, T.R., 2004. Plantar fasciitis and the windlass mechanism: a biomechanical link to clinical practice. Journal of Athletic Training, 39(1), p.77.

Bourne, M. and Varacallo, M., 2018. Anatomy, bony pelvis and lower limb, foot fascia. Europe PMC Bridgen, A. and Smith, S., 2008. Perceptions of podiatrists and physiotherapists working together in the musculoskeletal service. Podiatry Now, 11(10), pp.23-30.

Buchanan, Benjamin K. and Kushner D, 2017. Plantar fasciitis. Europe PMC

Cheatham, S.W., Lee, M., Cain, M. and Baker, R., 2016. The efficacy of instrument assisted soft tissue mobilization: a systematic review. The Journal of the Canadian Chiropractic Association, 60(3), p.200.

ClipArt ETC. 2021. Nerves of the Foot. [ONLINE] Available at: https://etc.usf.edu/clipsart/55459/55459 foot.htm. [Accessed 27 January 2021].

Cole, C., Seto, C.K. and Gazewood, J.D., 2005. Plantar fasciitis: an evidence-based review of diagnosis and therapy. American Family Physician, 72(11), pp.2237-2242.

Costa, I.A. and Dyson, A., 2007. The integration of acetic acid iontophoresis, orthotic therapy and physical rehabilitation for chronic plantar fasciitis: a case study. The Journal of the Canadian Chiropractic Association, 51(3), p.166.68

Cowley, M.S., Boyko, E.J., Shofer, J.B., Ahroni, J.H. and Ledoux, W.R., 2008. Foot

ulcer risk and location in relation to prospective clinical assessment of foot shape and mobility among persons with diabetes. Diabetes Research and Clinical practice, 82(2), pp.226-232.

Dimou, E.S., Brantingham, J.W. and Wood, T., 2004. A randomized, controlled trial (with blinded observer) of chiropractic manipulation and Achilles stretching vs. orthotics for the treatment of plantar fasciitis. Journal of the American Chiropractic Association, 41(9).

Draghi, F., Gitto, S., Bortolotto, C., Draghi, A.G. and Belometti, G.O., 2017. Imaging of plantar fascia disorders: findings on plain radiography, ultrasound and magnetic resonance imaging. Insights into Imaging, 8(1), pp.69-78.

Dziedzic, K. and Hammond, A., 2010 Rheumatology: Evidence-based practice for physiotherapists and occupational therapists, Rheumatology: Evidence-Based Practice for Physiotherapists and Occupational Therapists. Churchill Livingstone. DOI: 10.1016/C2009-0-37485-1.

Ernst, E., 2008. 'Chiropractic: A Critical Evaluation, Journal of Pain and Symptom Management. Elsevier, 35(5), pp. 544–562. DOI: 10.1016/j.jpainsymman.2007.07.004.

Ferdinand, N. C., Smith, S. and Smith, G. D., 2014. 'A survey comparing the perceptions of physiotherapists and podiatrists in the management of plantar fasciitis, International Journal of Therapy and Rehabilitation. MA Healthcare Ltd, pp. 526–538. DOI: 10.12968/ijtr.2014.21.11.526.

Fletcher, J., 2017 What is overpronation? [Online]. Available at: https://www.medicalnewstoday.com/articles/320383/ (Accessed: 30 January 2021)

Forcum, T., Hyde, T., Aspegren, D. and Lawson, G., 2010. Chiropractic Round Table. Plantar Fasciitis and Heel Pain Syndrome. Journal Of The American Chiropractic Association, 47(7).

Fraser, J.J., Glaviano, N.R. and Hertel, J., 2017. Utilization of physical therapy intervention among patients with plantar fasciitis in the United States. Journal of Orthopaedic & Sports Physical Therapy, 47(2), pp.49-55. 69

Haake, M., Buch, M., Schoellner, C., Goebel, F., Vogel, M., Mueller, I., Hausdorf, J., Zamzow, K., Schade-Brittinger, C. and Mueller, H.H., 2003. Extracorporeal shock wave therapy for plantar fasciitis: randomised controlled multicentre trial. BMJ, 327(7406), p.75.

Hains, G., Boucher, P.B. and Lamy, A.M., 2015. Ischemic compression and joint mobilisation for the treatment of nonspecific myofascial foot pain: findings from two quasi-experimental before-and-after studies. The Journal of the Canadian Chiropractic Association, 59(1), p.72.

Hammer, W.I. and Levy, I., 2007. Functional soft-tissue examination and treatment by manual methods. Jones & Bartlett Learning.

Hyland, M.R., Webber-Gaffney, A., Cohen, L. and Lichtman, S.W., 2006. Randomized controlled trial of calcaneal taping, sham taping, and plantar fascia stretching for the short-term management of plantar heel pain. Journal of Orthopaedic & Sports Physical Therapy, 36(6), pp.364-371.

Janisse, J. D. and Coleman, W., 2008. 'Pedorthic Care of the Diabetic Risk Category, in Bowker, J. H. and Pfeifer, M. A. (eds) The diabetic foot, pp. 529–546. DOI: 10.1016/B978-0-323-04145-4.50035-1.

Johnson, C.D. and Green, B.N., 2012. Diversity in the chiropractic profession: preparing for 2050. Journal of Chiropractic Education, 26(1), pp.1-13.

Kitaoka, H.B., Luo, Z.P., Kura, H. and An, K.N., 2002. Effect of foot orthoses on 3-dimensional kinematics of flatfoot: a cadaveric study. Archives of Physical Medicine and Rehabilitation, 83(6), pp.876-879.

Lareau, C.R., Sawyer, G.A., Wang, J.H. and DiGiovanni, C.W., 2014. Plantar and medial heel pain: diagnosis and management. JAAOS-Journal of the American Academy of Orthopaedic Surgeons, 22(6), pp.372-380.

Lewis, R.D., Wright, P. and McCarthy, L.H., 2015. Orthotics compared to conventional therapy and other non-surgical treatments for plantar fasciitis. The Journal of the Oklahoma State Medical Association, 108(12), p.596 not found in-text

Lim, A.T., How, C.H. and Tan, B., 2016. Management of plantar fasciitis in the outpatient setting. Singapore Medical Journal, 57(4), p.168.70

Lisowski, F.P., 2004. A guide to dissection of the human body. World Scientific.

Maartens, K., 2005. The efficacy of the Graston technique instrument-assisted soft tissue mobilisation (GISTM) in the treatment of plantar fasciitis in runners (Doctoral dissertation).

Martin, R.L., Davenport, T.E., Reischl, S.F., McPoil, T.G., Matheson, J.W., Wukich,

D.K., McDonough, C.M., Altman, R.D., Beattie, P., Cornwall, M. and Davis, I., 2014. Heel pain—plantar fasciitis: revision 2014. Journal of Orthopaedic & Sports Physical Therapy, 44(11), pp.A1-A33.

Malay, D.S., Pressman, M.M., Assili, A., Kline, J.T., York, S., Buren, B., Heyman, E.R., Borowsky, P. and LeMay, C., 2006. Extracorporeal shockwave therapy versus placebo for the treatment of chronic proximal plantar fasciitis: results of a randomized, placebo controlled, double-blinded, multicenter intervention trial. The Journal of Foot and Ankle Surgery, 45(4), pp.196-210.

McCallin, A., 2001. Interdisciplinary practice--a matter of teamwork: an integrated literature review. Journal of Clinical Nursing, 10(4), pp.419-428.

McFarland, M., 2017. Orthotics and Orthotic Devices - Orthopaedic and Spine Center of Newport News, January 15, 2017. Available at: https://www.osc ortho.com/blog/orthotics-and-orthotic-devices/ (Accessed: 4 May 2020). Date given as 2017 in text.

McKivigan, J.M. and Tulimero, G., 2020. An Analysis of Graston Technique® for Soft Tissue Therapy. Rehabilitation Science, 5(4), p.31.

McMillan, A.M., Landorf, K.B., Gilheany, M.F., Bird, A.R., Morrow, A.D. and Menz, H.B., 2012. Ultrasound-guided corticosteroid injection for plantar fasciitis: randomised controlled trial. BMJ. 344.

McPoil, T.G., Martin, R.L., Cornwall, M.W., Wukich, D.K., Irrgang, J.J. and Godges, J.J., 2008. Heel pain—plantar fasciitis, Journal of Orthopaedic & Sports Physical Therapy, 38(4), pp.A1-A18.

McNally, E. G. and Shetty, S., 2010. 'Plantar fascia: Imaging diagnosis and guided treatment, Seminars in Musculoskeletal Radiology, 14(3), pp. 334–343. DOI: 10.1055/s-0030-1254522.71 Meyer, J., Kulig, K. and Landel, R., 2002. Differential diagnosis and treatment of subcalcaneal heel pain: a case report. The Journal of Orthopaedic and Sports Physical Therapy, 32(3), pp.114-22.

Miyamoto, W., Takao, M. and Uchio, Y., 2010. Calcaneal osteotomy for the treatment of plantar fasciitis. Archives of Orthopaedic and Trauma surgery, 130(2), p.151. Moore, K. L., Dalley, I. I. A. F. and Agur, A. M. R., 2010. Clinically Oriented Anatomy 6Edition. Wolters Kluwer Health. Cited as 2010 in text.

Nahin, R.L., 2018. Prevalence and pharmaceutical treatment of plantar fasciitis in

United States adults. The Journal of Pain, 19(8), pp.885-896.

Nicholl, D., 2008. Plantar fasciitis: part 1. A grading system for plantar fasciitis; with a critical review of the aetiologies of plantar fasciitis. Podiatry Now, 11(12), pp.30-30.

Porter, D., Barrill, E., Oneacre, K. and May, B.D., 2002. The effects of duration and frequency of Achilles tendon stretching on dorsiflexion and outcome in painful heel syndrome: a randomized, blinded, control study. Foot & ankle international, 23(7), pp.619-624.

Radford, J.A., Landorf, K.B., Buchbinder, R. and Cook, C., 2006. Effectiveness of low-Dye taping for the short-term treatment of plantar heel pain: a randomised trial. BMC musculoskeletal disorders, 7(1), pp.1-7.

Rathleff, M.S., Mølgaard, C.M., Fredberg, U., Kaalund, S., Andersen, K.B., Jensen, T.T., Aaskov, S. and Olesen, J.L., 2015. High-load strength training improves outcome in patients with plantar fasciitis: A randomized controlled trial with 12-month follow-up. Scandinavian journal of medicine & science in sports, 25(3), pp.e292- e300.

Raval, P., 2018. Considering an Autoimmune Etiology in the Differential Diagnosis of Heel Pain, Podiatry Today, 31(2), p. 3. Available at: https://www.podiatrytoday.com/considering-autoimmune-etiology-differential diagnosis-heel-pain (Accessed: 4 May 2020).

Reeboonlap, N., Satitsmithpong, N., Phisitkul, P. and Charakorn, K., 2012. Outcome of plantar fasciitis treatment using monochrome infrared irradiation. Journal of Med Assoc Thai, 95(Suppl 10), pp.S147-50.72

Riddle, D.L., Pulisic, M., Pidcoe, P. and Johnson, R.E., 2003. Risk factors for plantar fasciitis: a matched case-control study. JBJS, 85(5), pp.872-877.

Roxas, M., 2005. Plantar fasciitis: diagnosis and therapeutic considerations. Alternative Medicine Review, 10(2).

Schwartz, E.N. and Su, J., 2014. Plantar fasciitis: a concise review. The Permanente Journal, 18(1), p.e105.

Smith, S. and Roberts, P., 2005. An investigation of occupational therapy and physiotherapy roles in a community setting. International Journal of Therapy and Rehabilitation, 12(1), pp.21-29.

Stuber, K. and Kristmanson, K., 2006. Conservative therapy for plantar fasciitis: a

narrative review of randomized controlled trials. The Journal of the Canadian Chiropractic Association, 50(2), p.118.

Thomas, J.L., Christensen, J.C., Kravitz, S.R., Mendicino, R.W., Schuberth, J.M., Vanore, J.V., Weil Sr, L.S., Zlotoff, H.J., Bouché, R. and Baker, J., 2010. The diagnosis and treatment of heel pain: a clinical practice guideline–revision 2010. The Journal of Foot and Ankle Surgery, 49(3), pp.S1-S19. Thomas, M.J., Whittle, R., Menz, H.B., Rathod-Mistry, T., Marshall, M. and Roddy, E., 2019. Plantar heel pain in middle-aged and older adults: population prevalence, associations with health status and lifestyle factors, and frequency of healthcare use. BMC Musculoskeletal Disorders, 20(1), p.337.

Uden, H., Boesch, E. and Kumar, S., 2011. Plantar fasciitis–to jab or to support? A systematic review of the current best evidence. Journal of Multidisciplinary Healthcare, 4, p.155.

Walther, M., Kratschmer, B., Verschl, J., Volkering, C., Altenberger, S., Kriegelstein, S. and Hilgers, M., 2013. Effect of different orthotic concepts as first-line treatment of plantar fasciitis. Foot and Ankle Surgery, 19(2), pp.103-107.

Wang, C.J., 2012. Extracorporeal shockwave therapy in musculoskeletal disorders. Journal of Orthopaedic Surgery and Research, 7(1), p.11.73

Watkins, J. and Mathieson, I., 2009. Chapter 4-Connective tissues. The Pocket Podiatry Guide: Functional Anatomy, pp.107-156.

Whittaker, G., Landorf, K., Munteanu, S., Menz, H., Tan, J. and Rabusin, C., 2017. Effectiveness of foot orthoses for plantar heel pain: A systematic review and meta analysis. Journal of Science and Medicine in Sport, 20, p.e40.

Woodburn, J. and Turner, D. E., 2010. Podiatry, biomechanics and the rheumatology foot, in Rheumatology: Evidence-Based Practice for Physiotherapists and Occupational Therapists. Churchill Livingstone, pp.171–184. DOI: 10.1016/B978-0- 443-06934-5.00013-9.

World Health Organization., 2005. WHO guidelines on basic training and safety in chiropractic. World Health Organization.

Young, C., 2019 Plantar Fasciitis: Background, Anatomy, Pathophysiology, Medscape. Available at: https://emedicine.medscape.com/article/86143-overview#a2 (Accessed: 5 May 2020).

Young, C.C., Rutherford, D.S. and Niedfeldt, M.W., 2001. Treatment of plantar fasciitis. American Family Physician, 63(3), p.467. Yousefi-Nooraie, R., Schonstein, E., Heidari, K., Rashidian, A., Pennick, V., Akbari- Kamrani, M., Irani, S., Shakiba, B., Hejri, S.M., Jonaidi, A.R. and Mortaz-Hedjri, S., 2008. Low-level laser therapy for nonspecific low-back pain. Cochrane Database of Systematic Reviews, (2)

APPENDIX A: INFORMATION LETTER

DEPARTMENT OF CHIROPRACTIC

RESEARCH STUDY INFORMATION LETTER

REC 11.0

Click here to enter the date.

Good Day

My name is Jenevieve Taljaard, **I WOULD LIKE TO INVITE YOU TO PARTICIPATE** in a research study on "A survey comparing the perception of Chiropractors and Podiatrists in the management of Plantar Fasciitis."

Before you decide on whether to participate, I would like to explain to you why the research is being done and what it will involve for you. **You will be required to go through the information letter and feel free to contact me if you have any questions.** This should take about 10 minutes. The study is part of a research project being completed as a requirement for a Master's Degree in Chiropractic through the University of Johannesburg.

THE PURPOSE OF THIS STUDY is to explore the similarities and differences in the perception of, and the most common treatment methods for plantar fasciitis between Chiropractors and Podiatrist.

Below, I have compiled a set of questions and answers that I believe will assist you in understanding the relevant details of participation in this research study. Please read through these. If you have any further questions I will be happy to answer them for you.

1. **DO I HAVE TO TAKE PART?** No, you don't have to. It is up to you to decide to participate in the study. I will describe the study and go through this information sheet. If you agree to take part, I will then ask you to sign a consent form.

2. **WHAT EXACTLY WILL I BE EXPECTED TO DO IF I AGREE TO PARTICIPATE?** If you choose to participate you will be required to fill out an online questionnaire with a series of questions. A questionnaire using QuestionPro will be distributed to all the registered Chiropractors through AHPCSA and all the registered Podiatrists through PASA via an email link. The email link will redirect the participants o and independent website to complete the online questionnaire together with the information letter and consent form. The letters will explain the research protocol and participant anonymity. Once the participant has completed reading the forms they will need to click on the “Agree and continue with Survey” button. This will signify that they give consent to participate in this study. Once participant has agreed to partake in the study, they will be redirected to complete the online questionnaire for completion. The survey will be on account of your own data cost.

3. **APPROXIMATELY HOW LONG WILL MY PARTICIPATION TAKE?** Your participation will take approximately 10 minutes of your time.

4. **WHAT WILL HAPPEN IF I WANT TO WITHDRAW FROM THE STUDY?** If you decide to participate, you are free to withdraw your consent at any time, before the point of data submission, without giving a reason and without any consequences. If you wish to withdraw your consent, you should inform me as soon as possible.

5. **IF I CHOOSE TO PARTICIPATE, WILL THERE BE ANY EXPENSES FOR ME, OR PAYMENT DUE TO ME?** You will not be paid to participate in this study, and you will not bear any expenses.

6. **IF I CHOOSE TO PARTICIPATE, WHAT ARE THE RISKS INVOLVED?** There are no risks involved in completion of the online questionnaire.

7. **IF I CHOOSE TO PARTICIPATE, WHAT ARE THE BENEFITS INVOLVED?** Once the research has been analysed the research would give us a better idea of what treatment methods is perceived to be effective for Plantar fasciitis. The perception between the two profession of who is responsible for what treatment method and how many patients present to Chiropractors and Podiatrist for treatment of Plantar Fasciitis.

8. **WILL MY PARTICIPATION IN THIS STUDY BE KEPT CONFIDENTIAL?** Yes, no identifying information will be required. The only information that you need to divulge is whether you are a registered Chiropractor at APHCSA or a registered Podiatrist at PASA, your gender and how many years you have been in practice. Under some circumstances, such as when required to do so by a court of law, I may have to disclose your personal information. In addition, it may happen that your information

will need to be reviewed by another organisation for quality assurance purposes. I will tell you about this if it happens.

9. **WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH STUDY?** The results will be written into a research report that will be assessed. In some cases, results may also be published in a scientific journal. In either case, you will not be identifiable in any documents, reports or publications. You will be given access to the results of this if you would like to see them, by contacting me.

10. **WHAT WILL YOUR RESPONSIBILITIES BE, AS THE RESEARCHER?** My responsibilities are to ensure that the research process is smooth and anonymity and confidentiality of participants respected ad adhered to.

11. **WHO IS ORGANISING AND FUNDING THIS RESEARCH STUDY?** The study is being organised by me, under the guidance of my research supervisor at the Department of Chiropractic at the University of Johannesburg. The study has not received any funding.

12. **WHO HAS REVIEWED AND APPROVED THIS STUDY?** Before this study was allowed to start, it was reviewed in order to protect your interests. This review was done first by the Department of Chiropractic, and then secondly by the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg. In both cases, the study was approved.

13. **ARE THERE ANY CONFLICT OF INTERESTS PERTAINING TO THIS STUDY?** There are no conflict of interests held by anyone involved in this study**.**

14. **WHAT IF THERE IS A PROBLEM?** If you have any concerns or complaints about this research study, its procedures or risks and benefits, you should ask me. You should contact me at any time if you feel you have any concerns about being a part of this study. My contact details are:

Jenevieve Taljaard

078647727

Jenevieve96@gmail.com

You may also contact my research supervisor:

Dr DM Landman

dirkiel@uj.ac.za

If you feel that any questions or complaints regarding your participation in this study have not been dealt with adequately, you may contact the Chairperson of the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg:

Prof. Christopher Stein

Tel: 011 559-6564

Email: cstein@uj.ac.za

FURTHER INFORMATION AND CONTACT DETAILS: Should you wish to have more specific information about this research project information, have any questions, concerns or complaints about this research study, its procedures, risks and benefits, you should communicate with me using any of the contact details given above.

Researcher:

Jenevieve Taljaard

APPENDIX B: CONSENT FORM

DEPARTMENT OF CHIROPRACTIC

RESEARCH CONSENT FORM

REC 11.0

A survey comparing the perception of Chiropractors and Podiatrists in the management of Plantar Fasciitis

Please initial each box below:

☐ I confirm that I have read and understand the information letter for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐ I understand that my participation is voluntary and that I am free to withdraw from this study at any time without giving any reason and without any consequences to me.

☐ I agree to participate in the above research.

_____ _____ _____

Name of Participant Signature of Participant Date

_____ _____ _____

Name of Researcher Signature of Researcher Date

APPENDIX C: PERMISSION LETTER TO AUTHOR

To Whom It May Concern

Permission to Use Questionnaire

My name is Jenevieve Taljaard and I am currently a registered MTech: Chiropractic student at the University of Johannesburg. One of the requirements for this qualification is to conduct a research study. I would therefore like to request your permission to use an adapted version of the Questionnaire in your study titled 'A survey comparing the perception of Physiotherapists and Podiatrists in the management of Plantar Fasciitis' to conduct the following study, entitled, "A survey comparing the perception of Chiropractors and Podiatrists in the management of Plantar Fasciitis."

Kindly find attached a copy of my proposal.

The details of my intended study are briefly outlined below:

Aim of the Study:

*

Permission is therefore requested to conduct this study using your questionnaire. On completion of the research, after the data has been captured, analyzed and a conclusion drawn, an account will be available in the form of a dissertation in the University of Johannesburg Library.

If you require further information, please do not hesitate to contact myself or my supervisor Dr Landman.

Kind Regards

Jenevieve Taljaard

Master's Student: 0728647727 -jenevieve96@gmail.com

Supervisor: Dr Landman 0115596820 -dirkiel@uj.ac.za

APPENDIX D: ASSISTANCE LETTER TO DISTRIBUTE SURVEY TO REGISTERED CHIROPRACTORS AT CHIROPRACTIC ASSOCIATION OF SOUTH AFRICA (CASA)

Dear Mrs. Jones

Assistance to distribute survey link to registered Chiropractors

My name is Jenevieve Taljaard and I am currently a registered MTech: Chiropractic student at the University of Johannesburg. One of the requirements for this qualification is to conduct a research study. The research study I am conducting: "A survey comparing the perception of Chiropractors and Podiatrists in the management of Plantar Fasciitis." I would therefore like to request your assistance to distribute the survey link via email to all the registered Chiropractors in the SA on my behalf.

The details of my intended study are briefly outlined below:

Aim of the Study

The aim of the study is to explore the similarities and differences in the perception of, and the most common treatment methods for plantar fasciitis between Chiropractors and Podiatrist.

Participation in this study will be voluntary and participants will only be required to complete an online questionnaire in their personal time. The information will remain

confidential and anonymous, and at no point will it be possible to track the data back to the participant. On completion of the research, after the data has been captured, analyzed and a conclusion drawn, an account will be available in the form of a dissertation in the University of Johannesburg Library.

Please find attached copies of the Information Letter and Informed Consent form to be provided to the practitioners.

If you require further information, please do not hesitate to contact myself or my supervisor Dr Landman.

Kind Regards

Jenevieve Taljaard

Master's Student: 0728647727 -jenevieve96@gmail.com

Supervisor: Dr Landman 0115596820 -dirkiel@uj.ac.za

APPENDIX E: ASSISTANCE LETTER TO DISTRIBUTE SURVEY TO REGISTERED PODIATRISTS AT PODIATRY ASSSOCIATION OF SOUTH AFRICA (PASA)

Dear Mrs. Amanda

Assistance to distribute survey link to registered Podiatrists

My name is Jenevieve Taljaard and I am currently a registered MTech: Chiropractic student at the University of Johannesburg. One of the requirements for this qualification is to conduct a research study. The research study I am conducting: "A survey comparing the perception of Chiropractors and Podiatrists in the management of Plantar Fasciitis." I would therefore like to request your assistance to distribute the survey link via email to all the registered Chiropractors in the SA on my behalf.

The details of my intended study are briefly outlined below:

Aim of the Study

The aim of the study is to explore the similarities and differences in the perception of, and the most common treatment methods for plantar fasciitis between Chiropractors and Podiatrist.

Participation in this study will be voluntary and participants will only be required to complete an online questionnaire in their personal time. The information will remain confidential and anonymous, and at no point will it be possible to track the data back to the participant. On completion of the research, after the data has been captured, analyzed and a conclusion drawn, an account will be available in the form of a dissertation in the University of Johannesburg Library.

Please find attached copies of the Information Letter and Informed Consent form to be provided to the practitioners.

If you require further information, please do not hesitate to contact myself or my supervisor Dr Landman.

Kind Regards

Jenevieve Taljaard

Master's Student: 0728647727 -jenevieve96@gmail.com

Supervisor: Dr Landman 0115596820 -dirkiel@uj.ac.za

APPENDIX F: QUESTIONNAIRE

PLANTAR FASCIITIS MANAGEMENT QUESTIONNAIRE

This questionnaire is designed to obtain feedback from you on your perceptions regarding the management of Plantar Fasciitis.

Taking part in this questionnaire is completely voluntary. The questionnaire consists of four sections. The questionnaire should take no more than 10 minutes of your time to complete.

Please answer the questions from your own perspective.

Thank you for taking the time to complete this survey. Should you have any questions, please feel free to contact:

Jenevieve Taljaard: 0728647727 or jenevieve96@gmail.com

Your co-operation is appreciated

SECTION A: BACKGROUND INFORMATION

1. What is your profession? Please select ONE option below.

Chiropractic	1
Podiatry	2

2. How many years have you been practising? _____

3. Are you male or female? Please select ONE option below.

Male	1
Female	2

4. In the last 12months, how many plantar fasciitis patients did you treat? _____

SECTION B: PERCEPTIONS OF SUCCESSFUL MANAGEMENT FOR PLANTAR FASCIITIS

5. Below is a list of management options. Please select the options that you as a practitioner consider to be effective in the management of plantar fasciitis. More than one option is allowed.

		NO	YES
5.1	Manipulation of the ankle joint	0	1
5.2	Joint mobilisation	0	1
5.3	Soft tissue mobilisation	0	1
5.4	Rest	0	1
5.5	Compression	0	1
5.6	Ultrasound	0	1
5.7	Instrument-assisted soft tissue mobilisation (Fascial Release- tools)	0	1
5.8	Cross friction massage	0	1

5.9	Extracorpeal shockwave therapy	0	1
5.10	Infrared	0	1
5.11	Dry needling	0	1
5.12	Laser	0	1
5.13	Acupuncture	0	1
5.14	Taping/Strapping	0	1
5.15	Calf stretching	0	1
5.16	Activity modification advice	0	1
5.17	Custom orthotics	0	1
5.18	Night splints	0	1
5.19	Arch support orthoses	0	1
5.20	Advice on new shoes	0	1
5.21	Heel cups/pads	0	1
5.22	Cryotherapy	0	1
5.23	Thermotherapy	0	1
5.24	Ball rolling	0	1
5.25	Advice on weight loss	0	1
5.26	Steroid injection	0	1
5.27	Other (non-surgical treatments only), specify……	0	1

SECTION C: FACTORS LIMITING SUCCESSFUL MANAGEMENT & OUTCOMES

6. Below is a list of personal limitations. Please select the limitation, which limits the outcome of management in patients with plantar fasciitis. Please select ONE option which is most applicable to you.

Lack of skill to treat plantar fasciitis.	1
Difficulty in differentiating between plantar fasciitis and other conditions presenting with heel pain e.g. Achilles tendinopathy, ruptured plantar fascia, heel pad syndrome (fat pad atrophy), calcaneal apophysitis (Sever's disease), calcaneal stress fracture, L4-S2 radiculopathy, tarsal tunnel syndrome and systemic disorder (rheumatoid	2

arthritis, gout, seronegative arthritis, reactive arthritis and ankylosing spondylitis).	
Factors that alter the biomechanics of the foot and ankle e.g. Intrinsic foot muscle weakness, excessive femoral anteversion, excessive lateral tibial torsion, leg length discrepancy and overpronation of the foot.	3
Difficulty in identifying the contributing factors in altered biomechanics e.g. Poor core stability, neural problems and weakened gluteus muscles.	4
Lack of equipment to treat plantar fasciitis.	5
No personal limitations.	6

7. Below is a list of service limitation. Please select the limitation, which limits the outcome of management in patients with plantar fasciitis. Please select ONE option which is most applicable to you.

Patients are not seen frequently enough for the treatment period provided by the practitioner.	1
Referral for management was too late.	2
Necessary equipment for the management is not available.	3
Waiting period for initial assessment of patients was too long.	4
Referring patient to other practitioners for assistant in the management of plantar fasciitis e.g. Chiropractor, Podiatrist or steroidal injections.	5
Lack in guidance in the management of plantar fasciitis.	6
No service limitations.	7

SECTION D: PERCEPTIONS OF DIFFERENT PRACTITIONERS ROLES IN THE MANAGEMENT OF PLANTAR FASCIITIS

8. Please select the box for the profession you think is responsible for the treatment method below. For every treatment method, please select one of the 4 boxes.

		Do not know	Chiropractors only	Podiatrists only	Either Chiropractors or Podiatrists	Neither Chiropractors nor Podiatrists
8.1	Manipulation of the ankle joint	0	1	2	3	4
8.2	Joint mobilisation	0	1	2	3	4
8.3	Soft tissue mobilisation	0	1	2	3	4
8.4	Rest	0	1	2	3	4
8.5	Compression	0	1	2	3	4

8.6	Ultrasound	0	1	2	3	4
8.7	Instrument-assisted soft tissue mobilisation (Fascial Release- tools)	0	1	2	3	4
8.8	Cross friction massage	0	1	2	3	4
8.9	Extracorpeal shockwave therapy	0	1	2	3	4
8.10	Infrared	0	1	2	3	4
8.11	Dry needling	0	1	2	3	4
8.12	Laser	0	1	2	3	4
8.13	Acupuncture	0	1	2	3	4
8.14	Taping or Strapping	0	1	2	3	4
8.15	Calf stretching	0	1	2	3	4
8.16	Activity modification advice	0	1	2	3	4
8.17	Custom orthotics	0	1	2	3	4
8.18	Night splints	0	1	2	3	4
8.19	Arch support orthoses	0	1	2	3	4
8.20	Advice on new shoes	0	1	2	3	4
8.21	Heel cups/pads	0	1	2	3	4
8.22	Cryotherapy	0	1	2	3	4
8.23	Thermotherapy	0	1	2	3	4
8.24	Ball rolling	0	1	2	3	4
8.25	Advice on weight loss	0	1	2	3	4
8.26	Steroid injection	0	1	2	3	4
8.27	Other treatment, specify……	0	1	2	3	4

9. QUESTION ONLY APLLICABLE TO CHIROPRACTORS. What are the main management methods for Chiropractors for treating plantar fasciitis? Please select all the applicable methods below.

		No	Yes
9.1	Manipulation of the ankle joint	0	1
9.2	Joint mobilisation	0	1
9.3	Soft tissue mobilisation	0	1
9.4	Rest	0	1
9.5	Compression	0	1
9.6	Ultrasound	0	1
9.7	Instrument-assisted soft tissue mobilisation (Fascial Release- tools)	0	1
9.8	Cross friction massage	0	1
9.9	Extracorpeal shockwave therapy	0	1
9.10	Infrared	0	1
9.11	Dry needling	0	1
9.12	Laser	0	1
9.13	Acupuncture	0	1
9.14	Taping or Strapping	0	1
9.15	Calf stretching	0	1
9.16	Activity modification advice	0	1
9.17	Custom orthotics	0	1
9.18	Night splints	0	1
9.19	Arch support orthoses	0	1
9.20	Advice on new shoes	0	1
9.21	Heel cups/pads	0	1
9.22	Cryotherapy	0	1
9.23	Thermotherapy	0	1
9.24	Ball rolling	0	1
9.25	Advice on weight loss	0	1
9.26	Steroid injection	0	1
9.27	Other treatment, specify …….	0	1

10. QUESTION ONLY APLLICABLE TO PODIATRISTS. What are the main management methods for Podiatrists for treating plantar fasciitis? Please select all the applicable methods below:

		NO	Yes
10.1	Manipulation of the ankle joint	0	1
10.2	Joint mobilisation	0	1
10.3	Soft tissue mobilisation	0	1
10.4	Rest	0	1
10.5	Compression	0	1
10.6	Ultrasound	0	1
10.7	Instrument-assisted soft tissue mobilisation (Fascial Release- tools)	0	1
10.8	Cross friction massage	0	1
10.9	Extracorpeal shockwave therapy	0	1

10.10	Infrared	0	1
10.11	Dry needling	0	1
10.12	Laser	0	1
10.13	Acupuncture	0	1
10.14	Taping or Strapping	0	1
10.15	Calf stretching	0	1
10.16	Activity modification advice	0	1
10.17	Custom orthotics	0	1
10.18	Night splints	0	1
10.19	Arch support orthoses	0	1
10.20	Advice on new shoes	0	1
10.21	Heel cups/pads	0	1
10.22	Cryotherapy	0	1
10.23	Thermotherapy	0	1
10.24	Ball rolling	0	1
10.25	Advice on weight loss	0	1
10.26	Steroid injection	0	1
10.27	Other treatment, specify……	0	1

The next 2 questions must be answered by both Chiropractors and Podiatrists

11. How many sessions do you use to treat Plantar Fasciitis? _____

12. Percentage of patients you have referred to either a Podiatrist (if you are a Chiropractors) or a Chiropractors (if you are a Podiatrist) in the last 12 months for plantar fasciitis. Please select the box applicable to you.

0%	1
25%	2
50%	3
75%	4
100%	5

APPENDIX G: STATKON FORM

UNIVERSITY OF JOHANNESBURG

DEPARTMENT OF CHIROPRACTIC

RESEARCH STATISTICS

This serves to confirm that the following student has discussed the research methodology with me as supervisor, and as such may consult with STATKON regarding the statistical analysis of the research.

Research title: A survey comparing the perception of Chiropractors and Podiatrists in the management of Plantar Fasciitis

Student name: Jenevieve-Jeanette Taljaard

Supervisor name: Dr. DM Landman

Contact number: 0844550303

Signed: Date: 21/05/2020

This serves to confirm that the above indicated student has discussed the relevant statistical analysis of the data that will be obtained in their trial, with STATKON.

Statistician name: AG KUHUDZAI

Signed: Date: 21/05/2020

APPENDIX H: ETHICS CLEARANCE LETTER

FACULTY OF HEALTH SCIENCES
RESEARCH ETHICS COMMITTEE

NHREC Registration: REC 241112-035

ETHICAL CLEARANCE LETTER
(RECX 2.0)

Student/Researcher Name	Jenevieve-Jeanette Taljaard	Student Number	201598919
Supervisor Name	Landman, Dirkie		
Department	Chiropractic		
Research Title	A SURVEY COMPARING THE PERCEPTION OF CHIROPRACTORS AND PODIATRISTS IN THE MANAGEMENT OF PLANTAR FASCIITIS		
Date	15 July 2020	Clearance Number	REC-589-2020

Approval of the research proposal with details given above is granted, subject to any conditions under 1 below, and is valid until 2021/07/14.

1. **Conditions:**
Gatekeeper permission, as required.

2. **Renewal:**
It is required that this ethical clearance is renewed annually, within two weeks of the date indicated above. Renewal must be done using the Ethical Clearance Renewal Form (REC 10.0), to be completed and submitted to the Faculty Administration office. *See Section 12 of the REC Standard Operating Procedures.*

3. **Amendments:**
Any envisaged amendments to the research proposal that has been granted ethical clearance must be submitted to the REC using the Research Proposal Amendment Application Form (REC 8.0) prior to the research being amended. Amendments to research may only be carried out once a new ethical clearance letter is issued. *See Section 13 of the REC Standard Operating Procedures.*

4. **Adverse Events, Deviations or Non-compliance:**
Adverse events, research proposal deviations or non-compliance must be reported within the stipulated time-frames using the Adverse Event Reporting Form (REC 9.0). *See Section 14 of the REC Standard Operating Procedures.*

The REC wishes you all the best for your studies.

Yours sincerely.

Prof. Christopher Stein
Chairperson: REC
Tel: 011 559 6564
Email: cstein@uj.ac.za

RECX 2.0 – Faculty of Health Sciences
Research Ethics Committee

Secretariat: Ms Raihaanah Pieterse
Tel: 011 559 6073 email: rpieterse@uj.ac.za

APPENDIX I: HIGHER DEGREES COMMITTEE LETTER

FACULTY OF HEALTH SCIENCES

HIGHER DEGREES COMMITTEE

HDC-01-41- 2020

16 July 2020

TO WHOM IT MAY CONCERN:

STUDENT: **TALJAARD, J**
STUDENT NUMBER: 201598919

TITLE OF RESEARCH PROJECT: A Survey Comparing the Perception of Chiropractors and Podiatrists in the Management of Plantar Fasciitis

DEPARTMENT OR PROGRAMME: CHIROPRACTIC

SUPERVISOR: Dr DM Landman **CO-SUPERVISOR:** -

The Faculty Higher Degrees Committee has scrutinised your research proposal and concluded that it complies with the approved research standards of the Faculty of Health Sciences; University of Johannesburg.

The HDC would like to extend their best wishes to you with your postgraduate studies

Yours sincerely,

Prof A Temane
Chair: Faculty of Health Sciences HDC
Tel: 011 559 6972
Email: anniet@uj.ac.za
17/07/2020

APPENDIX J: TURNIT REPORT

A survey comparing the perception of Chiropractors and Podiatrists in the management of plantar fasciitis

ORIGINALITY REPORT

8%	6%	3%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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